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INTELLIGENCE AND IMITATION IN BIRDS; A CRITERION OF IMITATION

By JAMES P. PORTER
Clark University, Worcester, Mass.

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I. INTRODUCTION

If in reply to the question "Do birds imitate one another?" the writer should answer merely in the affirmative, what would such a statement mean? To most people it would mean that birds individually seeing other birds perform a certain act, say pulling a string to open a door, copy this act more or less consciously and purposefully with a definite end in view. Such a reply would be understood to mean that all imitation is identical with that which conscious or possibly self-conscious adult human beings find in themselves. Perhaps a more schol-

arly and certainly a more academic response to such a query as the above would be to ask in turn "what kind of imitation do you want to know about?" With such a way of acting, or of getting things done, as that of imitative functioning which is felt to occupy such a large place in both animal and human mental development there are very probably different stages or levels. Indeed, these stages may be so well marked as almost to demand the assertion that there is imitation of different kinds. Without, however, maintaining that the results which we have obtained in our study of birds require us to go quite so far, it is hoped that the present and later papers will afford ample proof of the fact that in learning an action through imitation many species of birds do not imitate in the same way as human adult.

No student at all in touch with recent tendencies and problems in Psychology or in the study of Animal Behavior can question for a moment the possible practical value of a study of imitation in animals. The work of the student of animals will certainly be found to be valuable for the Experimental Pedagogy of which we hear so much at present. Not so much that direct application of conclusions will be possible as that methods and conditions of experimentation which one must perforce use with animals in order to determine accurately just the factors involved will be found at least of suggestive value to the student of Child Psychology, Experimental Pedagogy, and, most of all, Social Psychology. For some years the writer has found the principle of "trial and success" or "trial and error," as it is most commonly called, one of the most fruitful with classes in Social Psychology. It is the critical use of this and the results obtained by students of Animal Behavior, particularly on Instincts and Imitation, which constitutes one of the excellent points of that recent book by Davis on Psychological Interpretations of Society.[1]

The following may serve to indicate further the writer's feelings as to the probable bearings of the present studies of imitation in animals: Professor Royce, in "The Imitative Functions and their Place in Human Nature," *Century Magazine*, 1894, says, "As regards the uses and the results of the imitative functions in human life, the foregoing general indication of their breadth and depth is only the merest beginning of a comprehension of the part they play in our education and

[1] Professor McDougall's book, "An Introduction to Social Psychology," is in the first part very promising from the genetic point of view, but the later discussion is, to say the least, somewhat disappointing. Professor Ross's Social Psychology makes little attempt to analyze definitely either Suggestion or Imitation, much help in which is to be had from the study of animals as well as children.

in our consciousness. It is not because they are common, or because they are, in deepest origin, partly instinctive, that I lay such stress upon them. It is because they are in their proper and almost inextricable entanglement with our individual or temperamental functions, absolutely essential elements of all our rationality, of all our mental developments, of all our worth as thinkers, as workers or as producers; it is, too, because of this value of imitation as the necessary concomitant, and condition, and instrument of all sound originality which is still so inadequately understood by teachers, by critics of art, by students of human nature generally—it is on these accounts that I deem the study of the imitative functions probably the most important task in the psychology of the immediate future." In view of the analogies which we may safely infer to obtain between at least the higher animals and man, it is not too much to believe that the study of Animal Behavior may rightfully assume its part of this task.

Several years ago the writer made a series of tests on two house mice which were captured, in order to prevent their interference with his work with the birds. They, of course, liked the bird food, and, indeed, in one instance one mouse went so far as to open the door before the birds came down to the box.

Having taken prisoner two of these offenders I decided to test them with apparatus similar to that used by Small in his experiments I and II (*Amer. Jour. Psy.*. XI, p. 135). The results may be gathered into a table like the following:[1]

TABLE I

Results of tests with two House Mice giving time taken for the larger or smaller, or both, to find a way through the sawdust into a box in which food was placed. The time in this as in all the later tables is given in minutes and seconds.

Trial	Time	Order of Entering
1	17:	Smaller—Larger.
2	1:30	Larger—Smaller
3	2:	Larger
4	1:	Larger
5	:45	Smaller
6	2:	Smaller

The average time for the remaining thirteen tests does not fall below that for experiments 2-6 inclusive. There is the same alternation as to which first enters the box until the fifteenth test when the smaller enters first for the remainder of the series. There may be some interest for the reader in the

[1] These experiments were made in the Psychological Laboratory of Indiana University.

fact that according to my observation it required something like thirty to forty-five seconds for the mice to become adapted to the light. This came upon them suddenly when I raised from over them a second box in which they habitually stayed. As a rule they began to move about only after the lapse of this length of time.

Three tests were made on the first day and four each day following. After the seventh trial the mice could not have been very hungry, as bread crusts were inside their hiding place or on the floor of the cage. Meat or most often cheese was placed inside the sawdust box as a food more to their liking and as an incentive for their digging through.

So far as this single series is concerned, the mice learned more rapidly than the white rats tested by Dr. Small with the same apparatus. The initial times are shorter and the reduction of this to a minimum is more rapid with the mice. The fact that the mice had no hiding place except as they dug their way through the sawdust, may, in connection with their greater wildness, explain why they learned more rapidly than the white rats. The minimal time is about the same for both animals. The time required for adaptation of the eyes to the light is a rather constant factor for all the trials for the mice.

Another box with a zinc door held closed by narrow paper strips secured by wax, an apparatus very similar to another of Dr. Small's boxes, was used with the mice with practically the same, though less uniform, results.

We may ask (and this is the chief reason for introducing these results just here) how are we to determine to what extent and in what sense one mouse was imitated by the other? In several of the tests the one following seemed to dig in through the banked-up sawdust in its own way. Could the action of the other be then of any more than of the merest suggestive value? Was it merely the *following instinct* which is so prevalent in many species of animals and to some extent in man? Did one use the odor left by the other and thus have a stimulus at every step? If an odor stimulus does guide the animal at each turn, then it is not following a copy furnished by another, though the human observer would be unable to distinguish what was imitation and what was not.

These mice, as well as Berry's White Rats and Cats, and also the Raccoons studied by Cole and Davis, may all use the odor left by the animal which is acting as the model. This would seem, therefore, to suggest that all odors should be thoroughly removed from the apparatus before the animal to do the imitating is allowed to try. Spaulding, in testing the learning process in Crayfish, had to do this and all would agree

that to do so for tests of imitation would be as difficult as well as more necessary.

Birds would therefore appear to be very good subjects for a study of imitation since at least the higher ones have the olfactory lobes really very little developed and they probably use the sense of smell to small extent. For them the sense of sight is predominant as it is in man. In fact a good argument might be made to show that it plays even a larger rôle with birds than with almost any other animal. Edinger's work has shown how the keenness of vision, the large eye and the optic lobes enable them to see acutely and from afar. It is clear, then, that a careful estimate of the sort of contribution made by the separate sense fields is a prerequisite of the study of imitation. But what advantage is there in an animal which uses more exclusively the eye than the sense of smell as the source of stimuli which guide it to action? Obviously if our experimental apparatus were devised to appeal to the sense of smell, and if we as observers could detect that the animal, instead of acting on the odor stimulus, responded rather to the model set by another, then the odor guided animal would be the equal of those in which sight is predominant.

It is probable, however, that the eye requires in a less rigid way the following instinct. Certainly the criterion of the presence of imitation almost universally used by students of imitation, both human and animal, has shown that what the imitating animal sees done is thought to be all important. It is commonly stated that such an animal seemed to see what the animal to be imitated was doing. Seeing this, it did not work with the apparatus as it had previously done, but changed its method and followed the copy. Certainly such a standard as the above requires that the animal use the sense of sight and the more certain we are that keenness of vision is possessed by the animal the better prepared are we to start with.

Very few species of birds exist that are not the natural prey either of their own kind or other animals. To escape their enemies or to capture their prey very sudden and rapid action is absolutely necessary. The sensing of stimuli from afar and quick response is one of the most striking characteristics of birds. Can one bird imitate another and thus obtain food and escape enemies? If so, then we have in a way what may be called "vicarious functioning" to which, in fact, all imitation is equivalent. True we may find in birds no higher kind of imitation than the *following instinct*. Bird migrations and their other sorts of gregariousness in addition to the demand for sudden response mentioned above—all these emphasize the value to them of instinctive imitation. Illustrations of this

kind of imitation come very readily to mind. One bird starts to fly and the rest follow, one chick drinks and others do so at once.

The problem, then, of the present study is as follows: Can we by experiment and observation demonstrate that in these favorable subjects, the birds, facts are to be found which unmistakably point to imitation of a higher kind than the merely instinctive or the *following instinct?*

II. Methods of Experimentation

The purpose of the experiments with which we are here concerned may be said to be twofold. First, to obtain a measure of the rate of learning in as many different species of birds as possible. Secondly, to determine if and just how birds of the same and different species imitate each other.

One would naturally expect that conditions favoring imitation might very well interfere with a uniform rate of learning, and *vice versa*. If two birds fight or pay attention to each other, then neither can at the same time be working to open a box by pulling strings. Nevertheless the writer regards the second aim as more important than the first. At least the present study has been made from this point of view. Results on rate of learning in birds have already been obtained in sufficient number to make later ones chiefly corroborative in value.

The method throughout has been to place on the floor of the large cage in which the birds were confined a small box to be opened. The results in series A, B, and D were obtained in an in-door cage twelve feet long six feet wide and six feet high. The top and one side were covered with white muslin. The other side was formed by the wall of the room in which there were two large windows. The two ends were of wire mesh. The floor, the window sills (the floor being on a level with these), and posts were covered with white paper in order that as much light as possible might be had for taking photographs. All photographs taken in in-door cages have been taken with the camera concealed in an inverted box placed on the floor of the large cage. This box being left in the cage all the time, the birds were quite accustomed to it. It was found that for most days in midwinter with a rapid lens and plate very satisfactory results could be obtained in 0.02-0.01 sec.

Extreme hunger has been carefully avoided. The small box most used was the same as that used with the Cowbirds and Pigeons the description of which may be found on p. 257, volume XVIII of the *Amer. Jour. Psy.* This box is twenty inches long thirteen inches wide and twelve high. From Fig. 1 it may be seen that the door is placed in the middle of the front on which last and the left end is a wire mesh covering.

The door is opened by pushing or pulling in any direction any one of the four strings which in Fig. 2 are shown in the niche to the right of the door. It is easily evident that the door may be opened in several different ways. It is thought that this seeming objection in actual experimentation proved a decided advantage with some birds.

All the birds are first fed by means of food placed in this box for some time before they are required to open the door. In making an experiment the food is placed on the inside just beyond the wires. The door is then closed. The birds are free at all times to move around the box. No bird has ever been confined in order that it might see another first open the door and then be liberated and allowed to try for itself. Such a method requires a break in the time which is certainly more difficult for the animal to cross mentally than it is for man.

As will be evident in many of the later series, the experimenter has sought whenever possible, by change to a kind of food more to the liking of some birds present in the experiment, by change in the positions of the food-pan, by changes in location of the strings on the box, by the introduction of strange, more pugnacious, younger, or more active and playful birds; by all these and other means the experimenter has sought to produce rivalry, competition, struggle, fear, new caution, interest and attention and above all a real necessity and opportunity for each animal to do something. When these conditions are obtained (and even then) our laboratory conditions are far enough from matching those in the birds' free life outside.

Some of the series may seem to the reader to have been carried to unnecessary length, yet such tests as laboratory studies permit are very foreign to birds and should, therefore, be given many repetitions. How foreign and artificial one can scarcely appreciate unless he has sat by the half hour outside the cage looking through the peep hole and watched the birds in the early tests doing everything but pulling or pushing the (to the experimenter) perfectly obvious string.

It is probably more natural for one bird to imitate another in song, or for a parrot to imitate the human voice, and yet how long often does one have to wait for results. Many repetitions of a word are often required before we expect to get any attempt at imitation. Artificial tests, then, can hardly err on the side of supplying too many opportunities for one bird to see another perform the act which is the model.

It should be added, as well worth the time and patience required, that such changes as those mentioned above, particularly those of the location of the strings, are better calculated than almost any other to put to a real test the intelligence and

power of analysis possessed by these and other animals. In the experience of the individual animal, as in human experience, there is a constant recurrence of old situations with a slightly new aspect. Tests of the power of inhibition, of analysis, as well as imitation, the writer is constrained to believe find favorable conditions as much in varied relations of the same apparatus as in refinement and multiplication of new apparatus. The same food box used with most of my birds may seem to the reader an undue adherence to the rules of scientific experimentation, but the results we trust will abundantly justify the method adopted.

The sub-title of the present paper, "A Criterion of Imitation," has reference directly to a point of method rather than that of apparatus. In an earlier paper the writer obtained some results of interest from the standpoint of Imitation when a change was made in the fastening to a box and both English Sparrows (the one accustomed to opening the door in a now impossible way and the other never having opened the box) had opportunity at the same time to do something. The first tried the old method several times in the presence of the second whereupon the second gave some signs of imitation of a rather blind and impulsive kind.

Early in the present work the writer began to make use of a certain standard or criterion of the presence of Imitation which may be stated somewhat as follows: Bird No. 1 is induced to open a box which may be done in one of several different ways. Bird No. 2 by the means indicated above is allowed to supplant No. 1. The effect of this different method of opening on the behavior of No. 1 is closely observed and recorded. The behavior of No. 2 will rarely be identical repetition. We may be fairly certain, then, that No. 1 will have furnished to him by No. 2, or *vice versa*, an example or act to imitate.

Such a criterion has certain obvious advantages. Students of imitation in animals allow No. 1 only to try to open the box but never to succeed. They then allow it to see from some place of imprisonment, or other rather removed position, No. 2 do the act of opening. No. 1 is then released to see if he will do as No. 2 did. They by this method almost certainly get less of rivalry, effective interest and attention, or of that condition of the mental which in man is so often the precondition for the performance of the imitative act. This condition is probably most often brought about through the fact that the animal or human has had previous experience with, or similar to, the act to be imitated.

Let us consider briefly a concrete case or two, more of which we shall see later. The Old Crow left at once the end of the food box, to work as the young Crow had just done on the front

side, the strings which the Old Crow had pulled scores of times in earlier tests. Would he have done so without his previous experience? This Young Crow showed signs of imitating the Old Crow most often only when the efforts of the latter were similar to those previous efforts of the former which had resulted in opening the door and thus obtaining food. English Sparrows, Cowbirds, Bluejays, Baltimore Orioles, and Crows when submitted to experiment by negative as well as positive results, exhibit behavior which makes it advisable to use the criterion as stated above. If bird No. 1 has not previously opened the box it is unlikely that it will try vigorously to do so unless the experimenter can in some way delay action on the part of bird No. 2. But, if No. 1 has previously obtained food in its own way it not only will be more likely to struggle, fight, etc., with bird No. 2, but has given the experimenter, by its previous behavior, a standard by which to judge its present behavior. As a working hypothesis and standard of interpretation the reader is asked to hold in mind throughout this paper the criterion as stated above.

III. Results of Experiments

Series A. English Sparrows and Cowbirds

These birds, several pairs of each species, were forwarded to me in the same small box. While the large cage in which they were to be kept when experimented upon was being built they were placed in smaller cages and supplied with plenty of food, sand and water. It was interesting to see that the Cowbirds began at once on being liberated to bathe in the large water pans while the Sparrows showed a strong preference for the sand bath.

The Cowbird is much easier to keep in good condition than the English Sparrow and, I believe, than most other birds. Early in my work it was noted that the Cowbird was very attentive to the Sparrows. See Fig. 1, A. It soon developed that they were looking for parasites. Judging from the fact that I have never seen a single parasite really taken by them one would conclude that we may have to deal here with a very strong habit or probably an instinct. They look over very carefully the perches, window sashes, etc., in fact all objects where parasites might be found. It is probable that many times the Sparrows need the good offices of the Cowbird; but very early the male Sparrow learned always to keep a safe distance away. The little female Sparrow was able whenever she wished to so use her beak that the Cowbird refrained for a time from coming too near. Fig. 1 B. It is not impossible that a part of this behavior of the male Cowbird was due to the mating instinct.

After a few weeks during November the male Cowbirds began to strut and "gobble." I use here the terms for the rooster and "gobbler" because his actions and notes were strikingly similar to these, particularly the latter. Such actions were continued for two or three weeks at a time when they would cease to reappear again some weeks later. In addition to this "gobble" which is very like the call of the Redwing Blackbird, only not so loud and clear, my male Cowbirds further expressed their good feeling by a series of notes, low, liquid and, indeed, very musical. It needs only to be heard to be appreciated and enjoyed. Especial emphasis is made of this matter of song for the reason that it has not been heard by many. The female has only the low rough call characteristic of all the Blackbirds.

This series (Series A) was begun on November 11, '06. The box was the same as that used in earlier work and described in my "Further Study, etc.," p. 257. The niche between the posts to the right of the door is designated as Place 1, the niche to the left as Place 2, niches 3 and 4 are on the left end, and niche 5 on the rear right corner. Throughout this paper the cords placed across each of these niches are referred to as string A, B, C, and D, string A being the first from the bottom.

In the first trial the female English Sparrow was successful, but only after thirty-one minutes and one hundred and thirty-nine efforts. These last statements are only in a small way indicative of the energy she expended. The "efforts" were simply those attempts which were sufficiently definite for me to count, and consisted chiefly in hops upon the left end and

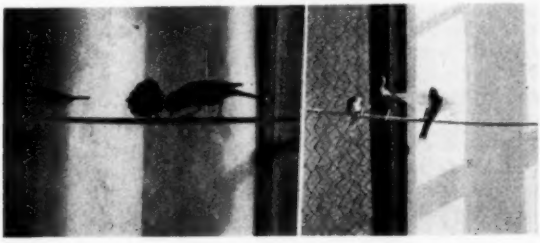

FIG. 1

A

The Cowbird looking for parasites on the perch and the female English Sparrow.

B

The female English Sparrow has resented the Cowbird's looking her over for parasites. The male English Sparrow is just alighting on the perch.

front of the box. As may be seen in the accompanying figure (Fig. 2), she opened the door in one of her first trials by

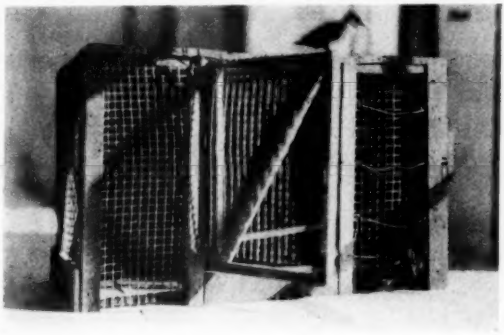

FIG. 2

The female English Sparrow (at the lower right hand corner of the box) opening the door by one of her first accidental methods. Many efforts of other kinds preceded this.

crawling in between the wire and strings and accidentally pulling on string B with the back of her head. In Fig. 3 is shown a way of opening the door which is, if such is possible,

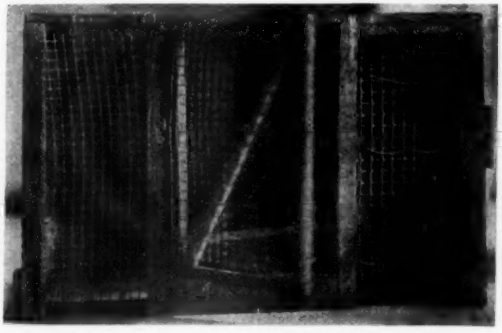

FIG. 3

The same English Sparrow as in Fig. 1 opening the door on the next day. She did not know what she had done until after she returned to the floor.

even more accidental. Here she is pushing down on string B with her head turned away from the door. She did not know

what she had done until she reached the floor and turned round. A little later in the series she hopped from the top and front edge of the box, turned as she did so, and seized the top string, D, in her claws. This is shown in Fig 4. This,

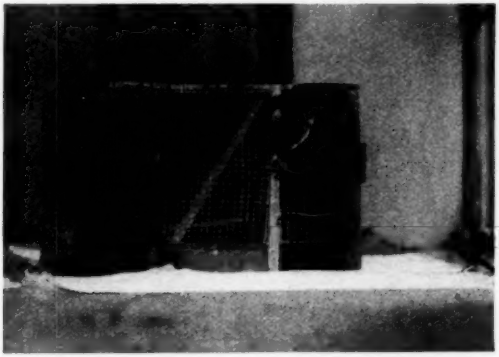

FIG. 4

The same bird as in Fig. 1. String D more directly worked with now than formerly.

with slight modifications, to be pointed out later, came to be her fixed method of opening the door. And yet she tried this

FIG. 5

The same female English Sparrow using the beak in addition to her claws. The door was rather refractory. The other birds were certainly more interested.

method only after many failures to reach the desired result through efforts very similar to those represented in Figs. 1 and 2. The reader will note that in Fig. 5 she is shown to be using the beak on the string in addition to the pull by the claws. This was done rather often when the door was a bit refractory. In other photographs not here reproduced it is shown that in the act of opening the door she scarcely stopped flying.

In one of his books C. Lloyd Morgan has called this method of animal learning that of "trial and error." This phrase has long been adopted by students of Animal Behavior. The reader will at once see that in the above series of photographs the writer was fortunate enough to obtain from this initial series a succession of this "hit and miss" or "try, try again" method purely accidental at first with the simplest and most direct act gradually selected. There is no question but that it is distinctively the animal method of learning. It means that successes are followed up because of the reward or pleasure (food in this case) which they bring. It means failures or less direct methods are discontinued because of the lack of satisfaction or pleasure.[1]

In the accompanying table are recorded some of the results of this first series of experiments. For lack of space many of those results which merely show a reduction in time required are omitted. With this and succeeding tables the reader is to infer that no significant change occurred in those cases which are omitted. The times are given in minutes and fractions thereof, and the number of errors is also given. Attention may at once be called to the fact that the times are not so rapidly and uniformly reduced to a minimum as in earlier experiments with the same birds, and as will be shown in later experiments with different birds, but it must be kept in mind that the number of efforts and not the time is the better measure. And also if this better measure does not show rapid learning, it should be remembered that rate of learning is not that in which we are primarily interested. Imitation is our first interest in these tests. It will be seen many times before we conclude, that a longer time or many efforts, extreme cau-

[1] The writer feels impelled to suggest that if Principal Morgan's phrase were revised to read "trial and success" instead of "trial and error" it would much more satisfactorily express what is here needed. The words "trial and error" express the unpleasant, the non-satisfying, the negative aspect of these responses while "success" could be expected to carry with it more directly the pleasurable and positive aspect. Some may point to the unwisdom of such a change when the phrase has become one of our stock-in-trade. The answer might be, however, that our science of Animal Behavior is still in its earliest infancy when changes are most easily made.

tion, lack of pugnacity, lack of fear, and many other apparent disturbances may be just the condition which shall allow the other birds, those not opening the door, to give evidence that they have the capacity to learn vicariously or through Imitation.

In the present series the female Sparrow was not in normal condition much of the time. The male Sparrow was very wild. The Cowbirds were not nearly so active as the Sparrows and usually made very few efforts. The later photographs show, however, that they learn to be present when the door is opened. They are certainly more attentive and interested if behavior is any criterion.

TABLE II

Results obtained with a pair of English Sparrows and Cowbirds.

Trial	Date	Time	Bird opening Box	Efforts by Bird opening box	and other behavior
1	11-16	31	Female Eng. Spar.	140	
2	"-17	12	"	56	
3	"-"	23	"		Not hungry.
4	"-18	2	"	1	
5	"-"	8:45	"		
6	"-19	5:40	"	3	
7	"-"	1	"	4	
8	"-20	3	"	6	
9	"-21	:35	"	1	
10	"-"	8:25	"	23	
11	"-22	5:20	"	1	
12	"-23	1:05	"	1	
13	"-"	:50	"	2	
14	"-24	:50	"	2	
15	"-"	1:15	"	3	On strings after door was open.
26	"-30	11:10	"	2	Escaped from cage and had to be caught.
27	12- 1	13:45	Male Sparrow	14	Not certainly imitation.
28	"-"	5:30	"		May be done in similar way due to great fear.
29	"-32	2:45	Female Sparrow	1	
32	"-"	36:15	Male "	20	Female not hungry because she escaped from cage and found food.
33	"- 4	10:20	Female "	2	
60	"-21	:17	"	1	On string once after door was open.
61	"-22	3:00	"	1	In poor condition.
65	"-31	12:35	"	1	
66	1- 1	2:25	"	1	Male apparently imitating a good deal.
71	"- 5	4:10	"	9	Strings to opposite side of door, place 2.
72	"-"	6:00	"	11	
73	"- 6	6:00	"	6	
74	"-"	1:50	"	1	
75	"- 7	:35	"	1	

TABLE II—*Continued*

Trial	Date	Time	Bird opening Box	Efforts by bird opening box and other beha ior
81	1-10	3:35	Female Sparrow	3 In poor condition.
82	"	:25	"	1
83	"	:40	"	2 Strings to left end, place 3. See Fig. 8.
84	"-11	1:33	"	1
85	"	:12	"	1
94	"-14	:23	"	1 Strings to rear on left end, place 4.
95	"	2:10	"	5
96	"-15	:16	"	1
103	"-19	1:08	"	1 Rear side of box changed so that there are posts and wire there. Disturbed.
104	"	:12	"	1
105	"-21	:18	"	1
111	"	:05	"	1
112	"-22	:36	"	1 Strings now on rear side, right corner, place 5.
113	"	:15	"	1
114	"	:17	"	1
125	2- 1	:50	"	1
126	"- 2	:26	"	1

NOTE. The results omitted from the above and following tables do not add anything to the typical results which are here given.

Very early the female Sparrow was seen to take her position on the front edge of the box and hop on the strings although the door was already wide open. Most often, of course, she did not do this. The occasion for this needless repetition lay in the fact that both Cowbirds early in the series came to be, with respect to food, what they are in the wild in the rearing of their young,—a kind of parasite. They waited until the door was opened and then went in to eat. They were nearly always the first to enter. There were often pitched battles in which the little female Sparrow was often victor. But the male Cowbird was on the whole too large for her. If he entered first, and soon left she approached the box and, this first link in the chain of reactions having been performed, the others followed; she pulled the string with the door already open. She did this on the 11th, 12th, 15th, and 60th trials. In earlier work I found the Pigeons and Cowbird doing the same thing. As will be seen later, it has been observed with nearly all of my birds. Taken in themselves such errors are perhaps of little value. As indications of the degree to which the bird analyzes the apparatus it is working with, as an index therefore of the extent to which the animal is conscious, they are most significant and important.

It should be noticed that the male Sparrow on the 28th and 32nd tests opened the door. He actually did it by hopping up

on the strings from the floor. As he was very wild, he never really alighted on the strings. He made many trials that were very similar to those of the female Sparrow. For the reason that she was not in good condition, her attempts to open the box were much delayed. Thus an abundant opportunity to open the door was offered the male.

Both his unsuccessful and his successful attempts, certainly the former, would, according to previous standards of imitation, without doubt be classed as due to imitation. It seems best, however, to delay such a classification until our tests have multiplied in number and other birds of the same and different species have been tried.

It has always seemed to the writer that students of Animal Behavior, particularly those who work with the higher animals, were in danger of overdoing the simple tests which deal only with simple association processes. As Professor Mills has pointed out, our tests should show the power of the animal in question to inhibit old associations and form new ones. Many of the series described will therefore have to do with changes in the location of the strings such that the above powers will be put to the test. Furthermore such modifications will also serve the very useful purpose of giving those birds expected to do the imitating the opportunity to manifest any tendency which they may have in reality to do so.

Accordingly after a series of seventy-eight tests during the second half of which the errors of the female English Sparrow were very few, the strings were changed to Place 2 on the opposite side of the door. What, now, is the effect on her behavior? In the part of the table following, "strings to opposite side of door," we see that at first she made numerous errors. But it is of interest to note that four of the nine errors in the first trial are on the new side, and are made because more force is required to open the door now. Of the eleven errors in the second trial, six are on the new side. In the third trial she went but twice to the old side, where there were no strings. In Fig. 6 we see that she came to use the beak in this series as well as in the first. It is only fair to state that about one-half the above errors are clearly due to the fact that her weight was not enough to pull up the latch. In fact by the third trial she had learned to wriggle while seizing the string in her claws. The left side of the door or this part of the box now seemed to be the more interesting to the male English Sparrow.

In that part of the table immediately following "strings on left end at front corner" (Fig. 7) we see that all eleven trials are without error except the first where there is but one. My notes record the fact that she inhibited the impulse to jump on the old positions many times. So far as "errors" are con-

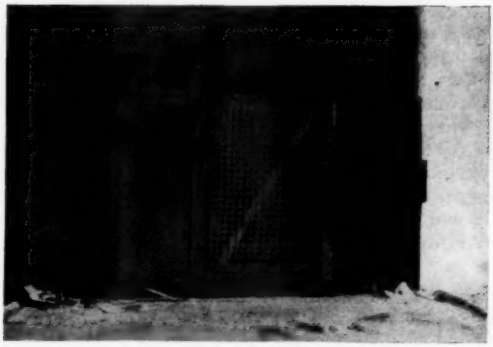

FIG. 6

The female English Sparrow of Figs. 1-5. Strings now changed to Place 2. She used the beak here also. See Table II or the text for the readiness with which this change was made.

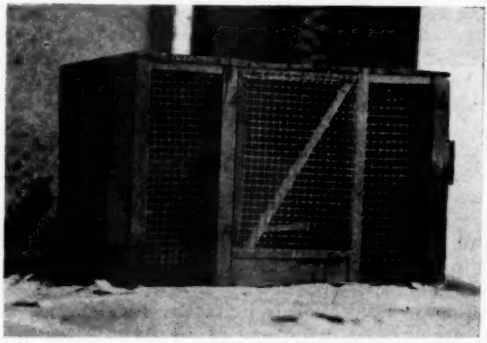

FIG. 7

Strings are shown in Place 3. See Table II or text for the way in which she learned this.

cerned, this series then, is almost perfect. Practically the same may be said of her behavior with respect to the remaining two changes,—"strings to left end at rear side" and "strings to rear side at right corner." There are no errors at all in the last series and the errors in the second trial of the last series but one are almost certainly due to the fact that she had something wrong with one foot.

Some interesting conclusions follow from what has just been given. It is evident that after the first change in the location of the strings, these come to stand out from the other parts of the box; they are distinguished. They are singled-out-elements of a compound, and we seem to get some little beginnings of what in human minds is called "abstraction." But let me hasten to say that the reader must not think that such abstraction is conscious in at all the degree in which we find it in adult human behavior. As has been suggested above, and as will be shown later, the *cause and effect* relation probably never is felt or thought by these birds. All that is meant is that some one part, rather than a definite place to hop upon, gradually comes to be felt apart and thus impulsively to be worked with more than some other.

Series B. Male English Sparrow and Female Cowbird

These birds are those which have been with the female English Sparrow during all the previous tests. The male Cowbird had been removed much earlier for the reason that it cost the female Sparrow too much of her energy to fight with him.

It will be seen from the table below (Table III) that the rate of learning is very slow with these two birds. The times are often very long and the errors for the English Sparrow many. This is chiefly due to his extreme wildness, and were it not probable that this very wildness really plays into the hands of the experimenter the present series should be counted in large part as a failure.

It is possible that being so long accustomed to seeing the female English Sparrow open the door they now sit and wait. They have learned *not* to do instead of to do. Thus they fail in thirty minutes in the first trial and the door is opened in the second trial by accident. In the third the male Sparrow succeeds in thirty-one minutes after many trials. The manner in which the door was opened by him is of interest. The uncritical observer might call it imitation, for he flies out from the front upper edge, turns, and in his flight seizes the strings. This is very similar to the method of the female Sparrow, but I have had frightened Sparrows behave in this same way when they were alone with this box. Furthermore I have observed this reaction in the English Sparrow as it seized a feather or bit of other material in its free life out of doors.

In the fourth trial both fail in one hour. But this apparently negative result really means quite different behavior by each of the two birds. The amount of activity and therefore the energy expended by the Sparrow is enormously greater than that of the Cowbird. The former shows signs of knowing where to alight, though he cannot overcome his fright. The

TABLE III

Results obtained by continuing the tests with the male English Sparrow and female Cowbird which were in the preceding series.

Trial	Date	Time	Bird opening Door	Efforts by Bird opening Door. Other behavior.
1	2- 3	30:	Failed	
2	"- 4	58:	Male Sparrow	Many efforts. Out from top, turned and near strings.
3	"- 6	31:	" "	58 of many kinds.
4	"- 7	60:	Failed	Sparrow much more active.
5	"-"	20:45	Female Cowbird	
6	"-"	19:45	" "	Sparrow many attempts.
7	"-"	55:55	Sparrow	He worked all the time. Very wild.
8	"- 8	49:30	"	Many movements like those of female Sparrow. Has known what to do almost from the first.
14	"-12	4:30	"	So wild that did not eat inside box.
15	"-13	20:20	Cowbird	Sparrow made 36 efforts.
16	"-"	44:45	"	2 Sparrow made 77 efforts. He was not well.
19	"-15	45	Failed	
20	"-"	1:30	Cowbird	She made very few efforts.
21	"-16	2:45	"	When ready she walked up and pecked string. See Fig. 8.
22	"-"	1:30	"	
30	"-21	26:	"	
31	"-"	4	Sparrow	
32	"-22	26:30	"	With beak as Cowbird did.
33	"-"	9	Cowbird	
40	"-26	1:40	"	
41	"-27	11:20	Sparrow	
42	"-"	9:20	Cowbird	Sparrow struck top of door as Cowbird had done.
45	3- 1	25:45	Sparrow	He pulled string with bill.
46	"-"	6:40	"	" " " "
47	"- 2	12:40	Cowbird	
48	"-"	18:45	Sparrow	" " " "Fig. 9.
49	"- 3	6:30	"	He tried his own method many times.
50	"-"	6:10	"	He continued both.
51	"-"	1:05	"	" " "
52	"- 4	23:45	Cowbird	
53	"-"	4	Sparrow	Combination. Fig. 10.
54	"-"	7:45	"	From the floor as Cowbird.
55	"- 5	17:15	"	" " " " "

TABLE III—*Continued*

Trial	Date	Time	Bird opening Door	Efforts by Bird opening Door. Other behavior.
56	3- 6	13:30	Sparrow	Combination.
57	"- 7	11:50	"	"
58	"-11	5:20	"	Cowbird often not down at all.
73	"-"	9:55	"	Female Sparrow present.
74	"-19	1:45	"	She disturbed considerably. He followed.
77	"-22	14:07	Failed	
78	"-23	13:20	Sparrow	
79	"-24	12:40	"	Another female Sparrow present.
95	4- 2	12:40	Cowbird	Strings to left of door.
96	"-"	10:40	Sparrow	As Cowbird did and as he had been doing for some time.
97	"-"	24:10	"	
98	"-"	4:20	Cowbird	Sparrow so wild he would not go in box at all.
99	"-"	11:40	"	
100	"- 3	4:25	"	
104	"- 5	9:10	"	
105	"- 6	3:45	Sparrow	
106	"- 7	38:55	"	
107	"- 8	5:15	Cowbird	
108	"- 9	7:45	"	
109	"-10	18	Failed	

Cowbird was successful during the fifth and sixth trials, Fig. 7, but as a rule (and this obtained throughout this entire series) she waited until the Sparrow had made many attempts; then she came down and by a few pecks on one of the lower strings opened the door. For example in the sixteenth, eighteenth and nineteenth the Cowbird was successful, but the Sparrow made thirty-six, thirty-six and seventy-seven efforts respectively. Although he was the one to open the door in the trials just preceding these last, his great fright and wariness would not allow him to enter the box and eat the food. His habit was to seize the bits of food and carry them out to the floor of the larger cage and eat them there. It is interesting that my notes record the fact that the Sparrow seemed ill and had seemed so for a few days previously. The Cowbird then continued to open the door until the thirty-fourth and thirty-fifth tests. In the latter the Sparrow used his beak on the string, which was the Cowbird's way of doing, Figs. 8 and 9. Some ten tests later the Sparrow came to strike with the bill the projecting upper edge of the door, a sort of effort which the Cowbird had been using for some time.

In the 48th, 49th, 51st and 52nd tests the Sparrow again used the bill to strike the first or second strings and he stood

on the floor. See Fig. 9. These would seem to be modifications of his two earlier methods. One might reasonably infer that such variants were due to the example he had had in the behavior of the Cowbird. It should be added, however, that my notes describe the efforts of the two birds in a different manner. Those of the Cowbird are designated as "mumbles

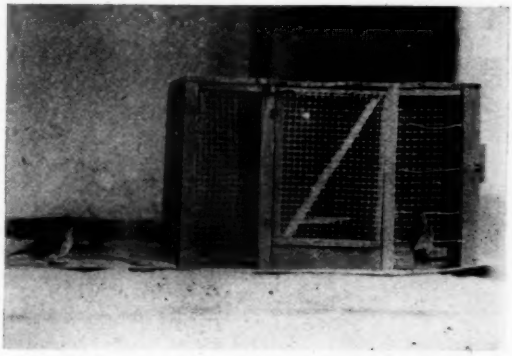

FIG. 8

The female Cowbird as she opened the door with the beak. This is a very simple way of opening the door. As a rule the male English Sparrow made many attempts before the Cowbird left the perch.

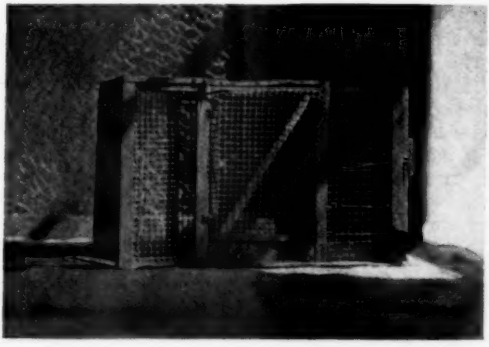

FIG. 9

The male English Sparrow as he opened the door following the times when the Cowbird had used her method shown in Fig. 8. He had been flying out from the top and alighting on the strings.

of the knots on the strings," those of the Sparrow as "pulls of the string."

In the 53rd test there occurred a change in the method of the Sparrow that should be of much interest to all students of animal and child life. Instead of using any of the methods he had up to this time employed he now alighted near the free side of the door and two-thirds the way to the top and struck the top string with his beak. A better way to express this

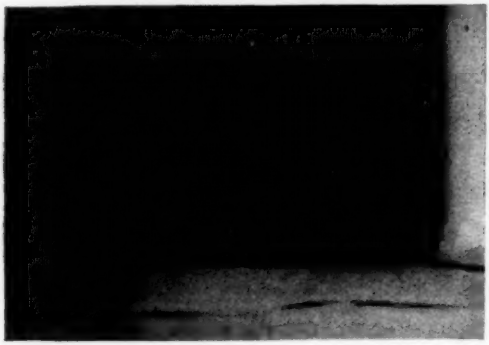

FIG. 10

The male Sparrow using his combination method. His fear seemed to be one of the chief incentives for this change from that shown in Fig. 9.

would be to say that after many attempts he succeeded in opening the door in this way. Fig. 11. In reality this method is to be designated as a combination of, at least, two of his previous methods. The writer would not have any one believe that this was a conscious invention on the part of this bird. He rather hastens to point out that such is very probably not the case. But neither are the first inventions of children consciously made. In fact such inventions as Professor Baldwin has cited and explained seem to be for the most part very similar to what is here recorded for the English Sparrow.

It was true many times that the female Cowbird did not come down at all until the door was opened. The Sparrow thus continued to open the door. A female English Sparrow was turned into the cage on the 77th test and a little later still another one. They served to distract him since he tended to follow them in their running around the box. If anything his fear which was constantly increasing was enhanced by their presence.

After the 100th trial the strings were changed to the left of

the door. The Sparrow pecked at the eyelets through which the strings passed on the old side, hopped up on the wire here and on the side where the strings were now. He seemed purposely to avoid hopping on the string. In spite of all his efforts he allowed the Cowbird to open the door in this 101st trial. But in the two following trials he was successful and performed as the Cowbird had done. In the remainder of the 115 trials he opened the door but once.

As a series to demonstrate animal stupidity the present would seem a good one. Yet as containing many results of interest to the student of imitation it is perhaps in many ways one of the best which the writer so far had obtained. There were many alternations between the two birds as to which one opened the door. The Sparrow's fright pushed him into many modifications and it so came about that he had a slow-going, timid but not wild bird as a model. Indeed, according to the writer's experience, it will seldom happen that conditions will arrange themselves in so favorable and fortuitously variable a manner as they did in this present series.

There are not many indications that the examples set by the Sparrows for the Cowbirds had any value whatever for any intelligent imitation. At the most they were only of general suggestive value and had their effect through the "following instinct." Such would fall under the head of instinctive imitation.

This is not saying that the Cowbirds are not capable of imitation of a kind higher than that which is instinctive. They may be, but not being at all as active as the English Sparrow it was not evident. Every one would agree that the manner of life of the English Sparrow for many hundreds of years has made them favorable subjects for such a study as the present one. Furthermore it should be asked,—Is it reasonable to suppose that a bird whose individual experience with this box is *nil*, or as little as that of the Cowbirds, could be expected to imitate beyond the instinctive level?

The effect on the Sparrows is quite different. They make readier use of the "following instinct" or instinctive imitation. But the chief question in this present connection is: are they able to use intelligent imitation, and in this instance was it imitation of the behavior of another species as well as that of their own? By intelligent imitation I do not mean the voluntary, reflective, intentional or rational. There may be something like the same difference between intelligent and rational imitation as has been long ago accepted between reasoned behavior and intelligent behavior. Intelligent imitation would thus require no reasoning, no very clear and definite idea of the end or re-

sult if any idea at all.[1] It would, however, demand considerable individual experience of the animal doing the imitating with the apparatus with which it is to work. The results so far obtained are too meagre to furnish us with a basis for generalization. They have suggested, however, the following questions as working hypotheses. Is it not rather futile to expect imitation above the instinctive grade of an animal without first giving it considerable individual experience with the mechanism it is to operate? Can we by allowing a bird to open a box in its own way establish a working basis for interest and attention so that if it sees the apparatus worked in a different and perhaps better way it will be led to add just a little more of the mental than is required in instinctive imitation?

A concrete illustration may help us here. The male English Sparrow toward the last of Series B, when the female English Sparrows were put in, ran round and round the box after them. This was instinctive. But he found it possible to open the box after the strings were changed to the left of the door only after the female Cowbird had done it once. If he followed her example even without appreciating the end (and I am inclined to think he did) then it is ever so slightly intelligent. At any rate we shall see what later series with many different kinds of birds will bring forth.

It would be natural to suppose that birds of any species would more readily imitate particularly in an instinctive way the actions of those of their own species. *A priori* a definite act which is to be imitated would be accompanied by more of general suggestiveness if done by one of their own kind. However, intelligent imitation based on so much of individual experience as was the case with this male English Sparrow, it would seem, need not be necessarily limited by the fact that the act is performed by a bird of another species. In fact it may be found that imitation of this sort is a mark of superiority of some birds over others depending as it probably does on a greater amount of activity and therefore having a better basis in a richer individual experience. It is not impossible that imitation of the instinctive kind is more natural and likely with the same species; intelligent imitation less so.

Series C. Results of Experiments with an Old Form of Food-box on English Sparrows and Cowbirds

This series of tests was made with the birds in a somewhat

[1] The writer does not maintain that the bird does not have reaching the food as an end but an imitative act *per se* must have in it as an essential part what we might term a proximate end. To be sure there may be several of these. To be in possession of these mentally certainly presupposes certain powers of analysis though these may be of all degrees of complexity.

smaller cage. This was only some six feet square, as tall as the larger, and built on the end of this larger one. Like the large cage, the floor of this was on a level with the window-sill. My chief difficulty was with the temperature. With the direct rays of the sun coming in through the one window and the fact that but one end of this cage was of wire, the heat became too great during the middle of the day even in midwinter. The results of this series contribute little positive with reference to imitation, but the negative results obtained are of suggestive value and interesting relations of the two species have been brought out.

As the reader may gather from the accompanying figure, Fig 11, the food-box here used is identical in principle with that which I first used. ,Fig. 1 *Am. Jour. Psy.*, Vol. XV, p. 319. Reference to Table IV will show that the female Cowbird first opened the door. In the next trial, though she made nine efforts, the female English Sparrow was successful. She did not pull the loop or strike at the free end of the latch, but pulled at the wire hinge which fastened this latch to the door. She drove all other birds away just prior to opening the door. It should be noted that after the door was opened in the first test the Sparrows did not enter, but ate the food thrown out through and under the wire by the Cowbirds. The Sparrow's method of opening the door cannot be called an imitation of that used by the Cowbird.

During the third test and some of the succeeding ones there were pitched battles between the Sparrows and the male Cow-

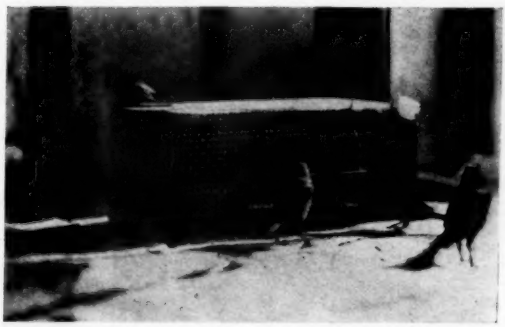

FIG. 11

Female English Sparrow opening door by pecking at the knot on the string where it passes through the latch. She repeatedly drove all the others away from the door in order to open it.

bird. Often the little female Sparrow dashed in and took food out of the Cowbird's beak in very much the same way as the English Sparrows, in their free life out of doors, may be seen to relieve the Robins of their choice worms.

At the eleventh test the string and wire were removed for the reason that the bird had now come to strike the latch where

TABLE IV

Trial	Date	Time	Bird opening door	Efforts by Bird opening door	
1	2-22	23:40	Female Cowbird	7	
2	"-"	6:40	Female Sparrow	3	Female Cowbird made 9 efforts.
3	"-23	26:50	" "	17	The Sparrow drove all others away.
4	"-24	10	" "	24	Struck some part of latch with the bill from the first.
5	"-"	9	" "	4	
6	"-25	3:10	" "	4	
7	"-26	3	" "	1	
8	"-"	10:30	" "	18	Taking photograph a disturbance.
9	"-27	7:30	" "	8	Struck latch after door was open.
10	"-"	12:10	" "	9	
11	"-28	2:35	" "	8	
12	3- 1	23	Failed	4	
13	"- 2	14:55	Female Sparrow	1	
14	"-"	20:50	" "	3	Not in good condition.
15	"-11	4:50	" "	9	Drove both Cowbirds away from any place where she wanted to get food.
16	"-12	10:20	" "	4	
17	"-"	14:45	" "	2	
18	"-13	1:50	" "	3	
19	"-14	1:40	" "	1	
20	"-15	3:25	Male Cowbird		By accident as he hopped off of box.
21	"-"	1	Female Sparrow	4	Two other female Sparrows present.
22	"-16	2:40	Female Sparrow 2		2 by Sparrow No. 2, 1 by Sparrow No. 1, and opened by No. 2, apparently imitation.
23	"-17	1:57	Female Sparrow 1	1	
24	"-"	1:15	" "	4	
25	"-"	3	" "	3	Boiled rice as food.
26	"-18	:40	" "	1	
27	"-"	:15	" "	1	
28	"-"	:20	" "	1	
29	"-19	:34	" "	3	
30	"-"	6:25	" "	4	Probably not hungry.
31	"-20	3:55	" "	4	Time and number of efforts fairly uniform after this to the close.
32	"-"	1:05	" "	1	
66	4-10	6	" "	1	

the knotted string passed through. For the twenty-first trial two other female English Sparrows were in the cage. The one designated as No. 2 was noted as showing most promise. In the following test the latter made a few efforts, then there was one effort by No. 1, after which very suddenly No. 2 opened the door by one well placed effort.

These results, which constitute all that were obtained during this series, are insufficient to serve as proof of imitation. Female English Sparrow No. 1 was too clearly the victor and in later tests drove away others of her kind as well as the Cowbird.

It will be seen that this series furnishes us with fairly satisfactory results so far as concerns times and efforts required. Toward the close the physical condition of the Sparrows did not warrant further trials.

Some weeks later an attempt was made to test a pair of Cowbirds and a Junco with the same form of simple maze which was earlier used with a Vesper Sparrow, a female Cowbird and several English Sparrows. See *Am. Jour. Psy.*, Vol. XVII, p. 253. It is not the intention here to state in detail the results obtained. In order to avoid the difficulty encountered earlier when some of the birds caught their claws in the wire mesh which formed the floor as well as the top and sides of this simple maze, the bottom was cut out. Typical results were obtained with each bird until they formed the habit of stopping at the far corner of the maze or that part which, because of the small size of the experimental cage, was thrown very near the window and on a level with it. The birds, instead of attempting to get through the maze, were attracted toward the source of light and thus stood still or struggled to escape.

This maze is therefore an unsatisfactory test for quantitative results when used under these conditions. In fact the writer had this feeling after having made the first tests.

Series D. A Pair Each of English Sparrows and Cowbirds and a Single Junco

For some years the writer had wanted to make tests similar to those made with the English Sparrow on the Junco. The reason for this is that the Junco remains in this latitude throughout the winter and lives in small groups. When a friend kindly brought me one of these birds, I lost no time in beginning work with it. It seemed none the worse for having bumped against the side of our library building. I found that it was easily kept in captivity since like the Cowbird it seemed to do much better on the various kinds of seed and cracked corn than the English Sparrow. From facts like these one may infer that the English Sparrow's rapid increase in numbers is

not due to the fact that it is more hardy than other birds. When placed in the larger one of my cages with a pair of English Sparrows and Cowbirds, the Junco spent the time during the first tests running back and forth on one of the window sills.

The male Cowbird opened the door during the first trial of this series in a purely accidental way. In the second trial the male Sparrow was successful. He did it in much the same way as the male of this same species who has figured in the earlier series A and B. His fright seemed to induce him to use this method of flying up and out and seizing the string without alighting. In the third and fourth tests the female Sparrow was successful by hopping up on one of the strings. In the fifth the Junco succeeded by striking the string with one wing as it chased the female Sparrow away from the front of the box. A great change had come in the Junco's behavior after the first trial and previous to the fourth. It chased the female Sparrow away at every opportunity, but was in turn no match for the male Sparrow. It was evident that the female Sparrow wanted to open the door. The female Cowbird remained outside the box when the Junco was on the inside.

In the sixth test the male Sparrow made an effort. The Junco chased the female Sparrow away several times. The latter was induced to run round the box several times by following the male Sparrow. Finally the female Sparrow opened

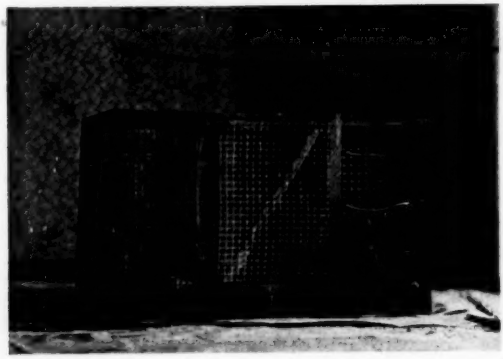

FIG. 12

The first method used by the Junco in opening the door. She must make many hops to this spot for the reason that her claws do not strike string B. The Cowbird is looking for parasites on the male English Sparrow.

the door and after the others were inside eating she jumped on the string once with the door open. In the seventh the Junco was successful, but the rival must first be chased away. Such control of the situation was not to last long, for in the fourteenth test the tables were turned and the female Sparrow proved now the better fighter. This as is stated in the table was probably due to the fact that she was not in good physical condition. It is often to be noted that such condition in the Sparrows causes them to be more pugnacious. It has been observed when these have had to chase the Cowbirds away.

The number of efforts required for the Junco to open the door was often very large and this continued throughout the whole of this series. The reason for this may be seen in Fig. 12. This bird often simply jumped astride String B without touching it. Frequently she must continue to jump until she does strike the string with one claw, usually the lower one. Certainly such a method does not point to a great degree of analysis of the task to be performed and which is performed. If she does this by imitation it is certainly of the blind sort. As to whether or not there is imitation the facts to be recorded now may give an answer.

In the seventeenth test the female Sparrow ran in from the window and made an attempt very quickly and just after the Junco had tried; when one approached the strings the other did so too. The rivalry was more intense.[1] In the succeeding test the Junco tried on the door at the same time and after the Sparrow was on the strings. Boiled rice had been placed in the box with the expectation that the female Sparrow would try harder. Such was really the case.

In the nineteenth test the female Sparrow would not allow the Junco to come near the box. During this test the reason occurred to me, for the fact that the female Sparrow finally opened the door by jumping on the top string, D. When she jumped lower than this there was space enough between the strings for her to alight without striking any of them, but not so at the top. The upper edge of the box crowded her down, as it were, so that in jumping to the wire she pushed in string D. This is strikingly similar in the lack of analysis of the relations of parts of the box to the Junco's great number of efforts, and prepares us to understand certain mistakes of the Bluebirds to be recorded later.

[1] The word "rivalry" is here used simply to indicate the struggle between these birds and does not imply that the writer regards it as the same as human rivalry.

TABLE V

Results of tests with a pair of English Sparrows, Cowbirds and a single Junco.

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box and other behavior.
1	5-22	11:	Male Cowbird	Accidental.
2	" "	22:	F. Eng. Sparrow	By flying up and while flying seizing string.
3	"-23	30:10	" "	Hopped on string.
4	" "	13:47	" "	
5	" "	3:	Junco	Struck string with wing in chasing Sparrow away.
6	" "	5:53	F. Eng. Sparrow	3 Other Sparrow tried once.
7	" "	4:53	Junco	1
8	"-24	5:43	F. Eng. Sparrow	2
9	" "	10:45	" "	1 Junco made 4 efforts.
10	" "	20:18	" "	8 Junco tried twice.
11	"-25	25:30	" "	2
12	"-26	25:10	" "	9 Junco struck at string and seemed ready to jump.
13	"-27	21:00	Junco	5 F. Sparrow not well.
14	" "	2:45	"	1 F. Sparrow and Junco were equally good fighters.
15	" "	5:05	Female Sparrow	1 on string 4. She drove Junco away.
16	"-28	16:30	Junco	11 F. Spar. 4 efforts. Rivalry.
17	" "	10:50	"	26 Rivalry more intense when one tried other followed.
18	" "	2:20	Female Sparrow	9 Junco on box as other was on strings. Boiled rice caused Sparrow to try more.
19	" "	5:30	" "	7 She did not allow Junco to try. Boiled rice caused Sparrow to try more.
20	" "	3:43	" "	1 Junco seemed to beg to be allowed to try. Boiled rice caused Sparrow to try more.
21	"-29	3:05	" "	3 Junco was driven away.
22	" "	6:24	" "	6
23	" "	1:05	" "	4 For some time she had been using string 4 probably because she was forced there from lack of space above it.
24	" "	2:30	" "	7
25	"-30	9:10	" "	18 Junco 14 efforts. No rice in.
26	" "	15:	Junco	28 Sparrow 15 efforts. No rice.
27	"-31	:30	"	5 Sparrow on door when it was opened by Junco.
28	" "	:55	"	5
29	" "	: 7	"	1
30	6- 1	:17	"	1
31	" "	:28	"	1 On strings twice after door was opened.
32	" "	1:55	"	13

TABLE V—*Continued*

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box and other behavior.
33	6- 1	:57	Junco	5 Sparrow again on door as it swung open.
34	"-"	:10	"	2
35	"- 3	3:07	Female Sparrow	1 Junco 9 efforts. As often before, she failed to alight on string.
36	"- 4	:06	Junco	1
37	"-"	:32	"	9
38	"-"	1:02	"	4
39	"-"	:57	"	6
40	"- 5	:05	"	2
41	"- 5	:32	"	9 Did not seem to know yet that the string had to be pushed in.
42	"- 6	:12	"	3
43	"-"	:37	"	6 Jumped astride of string 2 as shown in figure 12.
44	"-"	:38	"	6
45	"- 7	:20	"	4
46	"-"	:30	"	1
47	"-"	:25	"	6
48	"- 8	:05	"	1
49	"-"	:30	"	1
50	"-"	:32	"	7
51	"-"	:13	"	1
52	"-10	:17	"	2

In Fig. 13 we find a very interesting condition of things. In this, the twentieth test, the Sparrow, as may be seen, is holding the strategic position, but the jump to string D requires considerable effort in her depleted condition and she is hesitating, making starts, and hesitating again. All the while the Junco with open beak is uttering the most plaintive notes. It is certain that this bird would act at once if given the opportunity. Finally the Junco really showed signs of fighting. To obtain such a situation as this is rarely possible. It would seem that such might be a very favorable condition for the appearance of imitation, and certainly no small amount of suggestion and the "following instinct."

In the twenty-fifth test and those immediately following the boiled rice was omitted in order to see what effect this would have on the efforts of the Sparrow. It is evident that soon the Junco took the lead and with one exception retained it to the close. Both made many efforts. In the twenty-eighth trial the Sparrow was on the door when it swung open. She had jumped there just after the Junco had alighted on the strings. In the thirty-third test she again did the same thing. This series, then, points to rapid learning by the Junco, but to learning the same in kind as that shown by other birds. There

is a place to be hopped upon, but no further does the analysis go. Working on this place brings a pleasurable result, but there is no analysis. The keen rivalry and almost equal fighting ability, the change in the female Sparrow's condition of health and the food more to her liking were particularly suited to bring out some evidence of imitation. This evidence is of the same kind as that in series A and B and other evidence obtained later with the Crows and Orioles. There are some changes in the behavior of both the Junco and the Sparrow, changes from what we are pretty certain would have occurred if the other bird had not been present. These would point to imitation which might be called intelligent. That is, without first giving these birds previous experience with this box we could hardly expect the definite acts called forth in each by the other. There is much proof of the "following instinct."

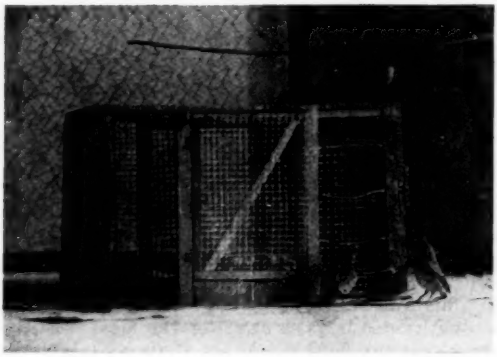

FIG. 13

The female English Sparrow was ready to jump on the top string. The Junco was standing by uttering a series of plaintive notes. These two birds often fought each other for the position in front of the strings.

Series E.

Tests with the Junco of the Preceding Series, a White-throated Sparrow, a Field Sparrow, a male English Sparrow and a young Song Sparrow.[1]

[1] It is a duty both pleasantly and gladly performed to be able to acknowledge at this point the courtesy and unreservedness with which Mr. and Mrs. Worthington of the "Worthington Society for the Investigation of Bird Life" placed at the writer's service for purposes of investigation every facility not only as to birds and cages at the aviary

It is well worth our while to note that this series and all that follow in the present paper were made on the birds in out-door wire cages most of which were ten feet square by six high. The conditions were very much more natural if they do not always give such uniform results as may be obtained by working on birds kept in the laboratory. Inside one can control the food supply as well as other conditions so that the birds are more hungry and undisturbed; but it is probably better to sacrifice nice uniformity for naturalness.

This series was really a Memory one for the Junco, the interval being some half a month. During this interval with three Cowbirds this bird was carried several hundred miles from the laboratory in Worcester, Mass., to Shawnee-on-Delaware, Pa., and placed in very different surroundings. The White-throated Sparrow had found its way into a wire cage at Mr. Worthington's Pheasantry, and was captured and placed in this cage. Its size and disposition, and ability to fight account for its early successes and for the long times even when the Junco opened the door. The White-throated Sparrow would not allow any of the birds to come near the box. This was not true for the first of the Junco's trials and it will be seen from the table that they were good. The short time of the Junco in the seventh trial, its first success, indicates that previous to this the White-throated Sparrow and the strange surroundings served to keep it away from the box.

The White-throated Sparrow, if we make an exception of her earlier trials, may be said to have opened the door in the manner used by the Junco. But she did not long continue this. She jumped up on the post rather than on the string. At times her efforts were as many as seventy-two and ninety-two, and largely for the reason that her efforts had to do with the post and not with the string, Fig. 14. This method was used habitually, and points to the kind of associations of which this bird was capable.

For the 129th test the food was shifted to the left side of the door, and in the next to the left rear corner. This was done with many of the birds in order to see whether it would lead them away from the strings, and cause them to work on another part of the box which was very similar in appearance to that where the strings were placed first. This change had no effect at this time, but after this bird and the Song Sparrow were transferred to another cage, such a change in the place of the food did have quite a disturbing effect. See tests 159, 160 and

but also in many other respects. My acknowledgments are gratefully made to Mr. Chas. W. Miller, Director of the Society, and to Mr. W. H. Montgomery for carrying on experiments during the writer's enforced absence, as well as for many other services.

161. In fact it was this change which introduced sufficient delay to make it possible for the young Song Sparrow to open the door. She did not, so far as could be seen, do so in an imitative way. Later there were a few movements which were similar to those of the White-throated Sparrow, but they did not have to do with the right part of the box.

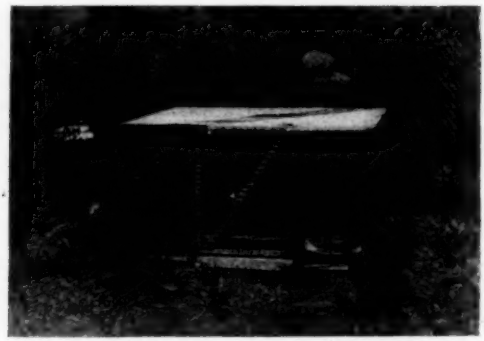

FIG. 14

This shows the method which the White-throated Sparrow used to open the door. She often was compelled to make many efforts because she alighted on the post rather than the outer end of String B,

TABLE VI

The Junco of series D, a Field Sparrow, a White-throated Sparrow and a male English Sparrow. Results of tests with the food-box.

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box	and other behavior
1	6-24	10:30	Failed		
2	" "	33:40	White-throated Sparrow	1	White-throated Sparrow is much the largest.
3	" "	5:10	Field Sparrow	7	
4	" "	1:30	White-throated	1	
5	" "	1:50	Field Sparrow	1	
6	" -25	1:35	White-throated	1	
7	" "	:55	Junco	1	
11	" -26	7:00	"	19	Strings damp. Early morning tests.
12	" "	2:12	"	41	" " "
16	" "	4:26	"	9	Raining.
17	" "	:20	"	1	
18	" "	5:21	"	27	White-throated not allow Junco to come near for some time.
19	" -27	:14	"	2	
43	7- 4	:10	"	1	
44	" - 5	4:10	White-throated	2	

TABLE VI—*Continued*

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box	and other behavior.
45	7- 5	1:50	Field Sparrow	1	
46	"-"	7:16	White-throated	1	
47	"- 6	:40	"	1	
48	"- 7	1:10	"	2	
49	"-"	1:35	Field Sparrow	1	
50	"- 8	3:10	White-throated	1	
51	"-"	3:50	"	1	
61	"-13	7:35	"	9	Junco 7 efforts.
62	"-"	4:00	Junco	4	
63	"-"	10:40	White-throated	6	Junco 26 efforts.
64	"-"	3:05	Junco	12	
65	"-14	19:35	Failed		Junco 21, White-throated 50, Field Sparrow 1.
66	"-"	1:20	White-throated	1	
67	"-"	:25	Junco	1	
70	"-15	:48	"	2	Male Eng. Sparrow in the cage. Junco on string with door open.
71	"-"	2:13	White-throated	1	
72	"-"	5:50	Junco	1	Male Sparrow tried twice.
78	"-18	16:00	Failed		White-throated 22 efforts, Junco 25, Field Sparrow 1.
79	"-"	8:00	"		Raining.
80	"-"	7:40	English Sparrow		White-throated 16 efforts, Junco 11 efforts.
81	"-"	2:08	Junco	1	
82	"-19	:38	White-throated	1	
83	"-"	:48	"	1	
84	"-"	2:11	"	2	Struck once with beak.
85	"-"	2:10	Junco	2	Junco mistook left end for front.
86	"-20	1:43	White-throated		12 efforts.
89	"-"	:45	Junco	1	
90	"-22	9:30	White-throated	72	
102	"-25	6:38	Junco	1	White-throated 4 efforts.
103	"-"	4:05	White-throated	3	Young Song Sparrow 10.
112	"-29	1:30	"	10	All mere passes at string. Really on post. See Fig. 14.
129	8- 3	:15	"	1	Food in left front corner. No effect.
130	"-"	2:18	"	1	Food in left rear corner. No effect.
131	"- 4	1:10	"	1	White-throated and Song Sparrow in a different cage.
132	"- 5	:45	"	1	
133	"-"	1:46	"	1	
134	"-"	1:20	Song Sparrow	3	
135	"-"	2:19	White-throated	2	Song Sparrow 2.
136	"- 6	:35	"	1	
159	"-13	2:22	"	6	Food to left of door caused some of the efforts to be on the left side.
160	"-"	1:30	"	3	

TABLE VI—*Continued*

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box	and other behavior.
161	8-14	1:38	White-throated Sparrow	15	Food in left rear corner. Greater confusion.
162	"	1:13	Song Sparrow	3	Not in imitating way.
163	"	2:16	"	3	Song Sparrow 7.
164	"-15	3:55	White-throated	1	
165	"	1:55	Song Sparrow	4	Song Sparrow 1.
166	"-16	:32	White-throated	1	
167	"	1:52	"	2	
168	"-23	:17	Song Sparrow	1	
169	"	1:04	White-throated	1	Song Sparrow 1.
170	"-25	6:38	"	34	New box. Must jump higher for string B.
171	"	7:25	"	35	
172	"-26	1:38	"	10	
173	"	2:45	Song Sparrow	2	One effort by Song Sparrow might be called an imitation of White-throated.
174	"	:14	"	1	
175	"-27	:30	"	2	One as in 173.
176	"	1:50	"	7	Two as in last test.
177	"-28	1:22	"	3	Successful by flying from a distance.
178	"	1:20	"	2	
179	"-29	:11	"	1	
180	"	1:55	"	1	
181	"-30	:47	"	1	
182	"	2:12	White-throated	17	
183	"-31	2:50	"	5	Song Sparrow 3.
184	"	1:16	Song Sparrow	1	
185	9- 1	5:32	White-throated	49	Song Sparrow 11. Many times the White-throated between strings A and B as the Bluebird.

In the 55th test the Junco mistook the end of the box for the front. I foresaw by her behavior that such was likely to happen and there was no error in the observation.

The new box used after the 169th test was a source of trouble for the White-throated Sparrow. String B was an inch or so higher than it was on the old box. She should now have jumped higher, but she did not learn readily to do so. This again was favorable to the Song Sparrow, who now opened the box until toward the close of the series.

The present series is not satisfactory from the standpoint of imitation. There are some signs of it, but they are inconclusive and do not satisfy the criterion which is adhered to in this paper. These results are interesting from the fact that new birds are tested and found to learn in a typical manner. If not so rapidly it may be due to the location of the cage and the interference of the White-throated Sparrow. She did not

learn rapidly; that is, the results for a time at least do not indicate it because of her indirect method. This method shows that she had no comprehension of the relations involved between parts of the box. The Junco probably forgot very little during the interval of half a month. It simply required a few trials to overcome the effects of the changed conditions. The effect of changed conditions is seen in the behavior of the White-throated Sparrow on the transfer of the food-pan in the strange cage.

Series F.

Tests with the Food-box on a Field Sparrow, a Junco and the male English Sparrow of the previous series after the White-throated Sparrow and Song Sparrow had been Removed.

These tests are open to the same disturbances which affected the last series. This cage was small, near the door into the building which opens into all the cages and nearest to the rear entrance of the main building. It follows that there were many disturbances.

It is to be noted that the Junco, the same as figured in series D and E, opened the door but three times during this series. The Field Sparrow seemed to get hungrier than the others. This and its greater tameness may explain why it was the bird with which we must deal in the present series.

In the 5th test the little Field Sparrow used a method similar to that used by many of the English Sparrows. This was to fly out from the upper front edge of the box, turn, and alight on one of the higher strings. Often alighting on the string did not open the door, but when she started to fly away the additional jerk she gave the string was sufficient to lift the latch. Frequently, however, this did not open the door. Very early she formed the habit of jerking the string by many flaps of the wings.

Her slight weight is the one chief cause of the fact that the times remain long and the efforts many. In general she learned as the others. As with many of my birds, though perhaps to a greater degree, she illustrates that fixity of the order of movements which they follow in the process of doing the thing learned. Her order was to fly first to a branch at the top of the cage, then to the water faucet, thence to the left end on top of the box, then to the right corner and thence off on the strings. Her conformity to this order was not without exceptions, but it was certainly striking.

TABLE VII

Really a continuation of the previous table but with only one Field Sparrow, the Junco of Series D, and the male English Sparrow in the cage.

Trial	Date	Time	Bird opening box	Efforts of bird opening the box	
1	8- 4	8:47	Field Sparrow	8	This bird was very much smaller than the others.
2	"-"	2: 5	"	3	
3	"- 5	9:50	"	10	
4	"-"	4:42	Junco	2	
5	"- 6	4:45	Field Sparrow	7	Flew out from top of box turned and alighted on string.
6	"-"	2:35	"	4	
7	"-"	3:35	"	2	
8	"-"	5:10	"	3	
9	"- 7	5:40	"	15	She was not heavy enough.
10	"-"	9:40	"	1	
11	"- 8	5:59	"	2	
12	"-"	1:12	"	2	
13	"- 9	4:37	"	12	
14	"-"	:30	"	1	
15	"-"	2:28	"	4	
16	"-10	4:16	"	2	
17	"-"	4:38	"	1	
18	"-"	1:50	"	6	
19	"-"	9:10	Junco	1	
20	"-11	1:10	Field Sparrow	3	
21	"-"	1:06	"	4	
22	"-12	1:29	"	2	
23	"-"	:50	"	3	
24	"-13	:53	"	4	
25	"-"	:33	"	3	
26	"-14	:14	"	2	
27	"-"	1:28	"	4	
28	"-"	:42	"	3	
29	"-15	:12	"	1	
30	"-"	1:	"	2	
31	"-16	:50	"	2	
32	"-"	1:40	"	1	
33	"-17	:13	"	5	
34	"-23	2:23	"	3	
35	"-25	1:	"	4	
36	"-26	:40	"	6	
37	"-"	:22	"	1	
38	"-28	2:10	"	3	
39	"-30	:30	"	2	
40	"-"	:17	Junco	1	
41	"-31	1:48	Field Sparrow	2	
42	9- 1	:19	"		

Series G.

Result of Tests with the Food-box on a pair of Bluebirds and White-crowned Sparrows; also two of each of the following named species,—Juncos, and Song, Tree, and Fox Sparrows. There were probably for the best results too many birds in

this cage. There is apt to be too much fighting and it is impossible to keep a satisfactory record of all that is done by the different birds. The chief cause for having so many was that all the other cages were occupied by birds engaged in mating or in rearing young. Indeed it was later learned that these Bluebirds were so engaged. This fact may partly explain why they came to be masters of the situation in this instance.

It is interesting to note that it is the best fighters here, as in a series earlier described, which first open the box. However, this does not mean that they continue to hold first place throughout the series.

The Bluebirds exhibited that characteristic timidity which may be seen in a little observation out of doors. They never attacked the other birds and strictly minded their own business. Many times they were compelled to beat a hasty retreat by the Tree, White-crowned, or Song Sparrows.

If what one may observe in a wire cage of this size (ten feet square by six feet high) of the insect-catching habits of these birds is any criterion, the Bluebirds far outclass any of the others. They gave abundant evidence of being able to see small insects when at least some six to eight feet distant and, of course, lost no time going after them.

From the accompanying table it may be seen that there is much alternation at first. The Bluebirds are not much in evidence until the 6th test when the male opened the door, the female being successful on the 7th test. This looked like imitation and yet as she had no previous method it cannot be said that she was following the example set by the male in what she did. For the present it is probably best to regard their behavior as similar responses to the same situation, with a strong tendency in these Bluebirds to follow each other rather than any of the birds of the other species. The Bluebirds were the rightful owners of this cage. The other birds were turned in only a few days before the tests were begun.

TABLE VIII

Results of tests with Food-box on a pair of Bluebirds and White-crowned Sparrows; also two each of Tree, Song and Fox Sparrows; also two Juncos.

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box and other behavior
1	6-15	4:50	Tree Sparrow	11 Stepped on string. Tree Sparrow was a good fighter.
2	" "	5:45	White-crowned Sparrow	4 White-crowned Sparrow stepped on string was a good fighter.
3	" "	3:	"	3
4	" "	20:45	Tree Sparrow	2

TABLE VIII—*Continued*

Trial	Date	Time	Bird opening Box	Efforts by Bird opening Box	and other behavior.
5	6-15	7:25	Tree Sparrow	4	
6	"-"	3:	Male Bluebird	2	By alighting on strings.
7	"-"	1:25	Female "	2	" " "
8	"-"	:40	Tree Sparrow	2	
9	"-"	:25	"	1	
10	"-16	1:05	Female Bluebird	1	
11	"-"	5:55	Male "	2	
12	"-"	5:25	" "	5	
13	"-"	:20	Female "	1	
14	"-"	9:05	Tree Sparrow	1	Female Bluebird many efforts.
15	"-"	7:20	"	1	
16	"-"	1:05	Fox Sparrow	1	
17	"-"	4:40	M. White-crowned	1	
18	"-17	8:	"	1	
19	"-"	1:30	Song Sparrow	3	
20	"-"	4-20	" "	2	
21	"-"	2:35	Male Bluebird	2	
22	"-"	4:55	Fox Sparrow	1	
23	"-"	2:38	Male Bluebird	2	
24	"-"	9:35	Tree Sparrow	2	
25	"-"	1:	M. White-crowned	1	
26	"-"	12:55	Male Bluebird	4	
27	"-"	2:45	"	2	
28	"-"	2:05	F. White-crowned	1	
29	"-"	2:40	Tree Sparrow	5	
30	"-18	17:47	Male Bluebird	1	Early morn'g tests, strings damp, and pull hard.
31	"-18	23:10	Tree Sparrow	8	
32	"-19	:20	" "		
33	"-"	1:	Junco		
34	"-"	:40	Male Bluebird		
35	"-"	:40	Female "		
36	"-"	:50	Male "		
37	"-20	:50	" "		
38	"-"	1:35	Fox Sparrow		
39	"-"	:05	Male Bluebird		
40	"-"	2:15	Tree Sparrow		
41	"-21	8:35	Male Bluebird		
42	"-"	2:25	White-crowned		
43	"-22	1:30	Tree Sparrow		
44	"-"	1:15	Male Bluebird		
45	"-"	18:30	Fox Sparrow		
46	"-23	2:10	Tree "	5	
47	"-24	:55	Male Bluebird	1	
48	"-"	3:30	Female "	1	From perch to string as male Bluebird often did.
62	"-26	6:11	Male "	1	
63	"-"	2:27	Song Sparrow	1	
64	"-"	6:35	Male Bluebird	4	
141	7-17	:13	" "	3	

Much the same succession followed in the 11th test for the male, who opened the door in the same manner as the female had

just done. In the 35th, the 48th and the 55th tests she opened the door in much the same manner as both had done previously. According to my notes the correspondence between the behavior of these two birds is close, but there is little proof that one changes its behavior because of the example set by the other. Fig. 15.

At about the 47th test the male Bluebird began regularly to open the door. The table is not carried farther than the 64th test for the reason that nothing except a lowering of the time and number of efforts occurs. There is little necessity then for a tabular statement of the remainder of the 141 tests. It should be added that the number of efforts by the male Bluebird is often greater than would be expected. An explanation for this may be found when we see what occurred in the Memory series which were made after one month had elapsed.

Memory Tests

For these tests the Bluebirds were alone and in a smaller cage. They were placed here sometime prior to the beginning of this series. From any of the results, or an average of the entire number, it may be seen that they have by no means lost all the training due to their earlier experiences with this box. Their average time is perhaps three or four times what it was at the close of the initial series. Barring disturbing factors in both the initial and first part of the memory series the number of efforts required is about the same. It is probable

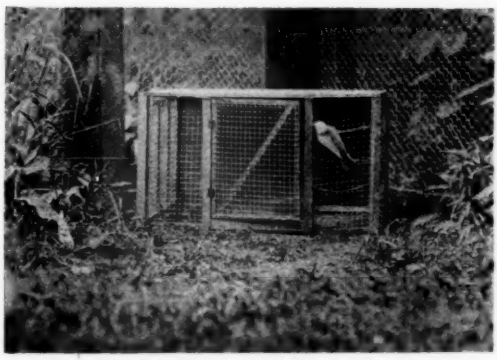

FIG. 15

The male Bluebird in characteristic position to open the door. A white-crowned Sparrow in front and to the left.

that the changed conditions cause the time to be longer. In fact it was noted at the time that such was the case.

Aside from showing how well they remember, this memory series shows some very interesting happenings. How they remember is even more significant. For the 5th test I inadvertently placed the food-pan behind the door instead of just inside the wire from the niche where the strings were placed. The male Bluebird at once made six trials on the door where there were no strings. I then interrupted long enough to place the food-pan in its old place and he immediately alighted on the wire between the strings. Are we then to infer that he has been primarily alighting in a certain place and rather as an accompaniment of this place association he has through no definite intent of his been pushing the strings in or down and opening the door? The greater number of efforts than we should expect in the last part of the initial test series belongs with this sort of association and really should have prepared us for the fact just mentioned.

TABLE IX

Memory tests for Bluebirds. One month interval.

Trial	Date	Time	Bird opening Box		Efforts of Bird opening Box and other behavior
1	8-17	:30	Male	Bluebird	1
2	" -"	:25	"	"	1
3	" -18	:20	"	"	1
4	" -23	:20	"	"	1
5	" -24		"	"	6 Food-pan placed just behind door. Male Bluebird made 5 efforts. Food pan then placed behind strings. One effort there opened door.
6	" -25	:13	"	"	1
7	" -"	:46	"	"	4 A new box with strings A and B slightly wider apart. Many times to the wire without touching strings.
8	" -26	1:12	"	"	7
9	" -"	:25	"	"	4
10	" -"	:30	"	"	3
11	" -27	1:08	Female	"	1
12	" -"	:55	Male	"	7
13	" -28	:30	"	"	5
14	" -"	1:13	"	"	5
15	" -29	:48	"	"	4
16	" -"	:28	"	"	6
17	" -30	1:13	"	"	6
18	" -"	:16	"	"	1
19	" -31	:25	"	"	1
20	" -"	:30	"	"	3
21	9- 1	:20	"	"	1

In conjunction with the next observation to be related and many other facts concerning the kinds of error made by birds of other species, it would seem possible to throw some additional light on the extent to which these birds really analyze the situation which confronts them.

For the sixth test of this Memory series another box to be opened was used. This new box had to be used with the Bluebirds, Field Sparrows, and White-throated Sparrow, in order that I might change the fastening on the old box and use it with the Baltimore Orioles and Blue Jays. The new box was identical with the old except that a slightly wider space was left between strings A and B.

The number of efforts required for the male Bluebird to open the box at once increased. It was easily observed that he alighted on the wire between strings A and B. Ostensibly his trials were more numerous for the reason that there was now greater space here and he could hop on the wire without striking the strings. If this is true then what is good from the standpoint of Memory alone need not signify much when we inquire as to the degree of analysis of which this bird is capable. We get a suggestion from this of how lacking in real analysis any act of bare recollection may be. These strings have not meant and never could mean to him at all what they mean to human consciousness. It was not for him the strings to pull, but a place to alight; more correctly perhaps he just alighted. Even saying no more than that it was a place to alight is putting it too anthropomorphically. True the bird is intelligent, but his consciousness must be far more simple, vague and unanalytic than our own.

Imitation is not clearly shown in this Memory series. The female does at times make trials at the same time with the male or follow him closely. But as in so many other series of tests, the writer feels that his criterion has not been met in a satisfactory way.

Series H.

Tests with Food-box on a Pair of Blue Jays.

The results obtained from a long series of tests with these birds is doubly interesting for the reason that this pair of Jays was reared by hand. They were very tame, or soon became so. Often they alighted on my back while I was placing the box in the cage. If at all hungry the male had to be carefully watched or he would alight on top of the box and take food from the pan as the box was carried into the cage.

These Jays, particularly the male, were very musical. It is said that much of it comes from the imitation of musical instruments like the mandolin, guitar and violin, all which they

have had opportunity to hear. However uncertain this may be, I have never heard such notes by Jays in their natural haunts. I doubt if many other birds can surpass such low, sweet, metallic notes which they were wont to put together in the most pleasing way.

The Jay, like the Crow and English Sparrow, is popularly considered as a very intelligent bird. As with the Crow, it was to be expected that they would use the beak on the strings, Fig. 16. This they did throughout, making only a few attempts to open with the claws or hop up on the box as the smaller birds do most frequently.

The beginning tests, as may be noted, if the reader will refer to the table below, are of the same general kind which have been found for all smaller birds. This is true, particularly of all those which are compelled to open the door without any example by another bird which may serve as a model to be imitated, or what is probably more often the case, as only of general suggestive value which calls into play nothing more than what may be designated as the following instinct.

It should be said that because of lack of time these Jays were not allowed to eat from the box previous to the first tests and thus get accustomed to obtaining their food from it. This, of course, might have affected the first few results, but only these.

FIG. 16

The male Blue Jay is in the act of opening the door by pulling the knot on String B. In test 110 (Table X), though the strings had been changed to the left of the door, this bird persisted in opening the door by reaching through the wire and pulling up the latch.

TABLE X

Test with Food-box on Blue Jays.

Trial	Date	Time	Bird opening Box	Efforts of Bird opening Box	and other behavior
1	7-15	30:	Failed		
2	" "	1:35	Male Jay		
3	" "	1:05	"	1	Chased away female
4	" "	:20	"		
5	"-16	20:22	"	32	Female many efforts also.
6	" "	1:35	"	10	
7	" "	2:13	"	29	
8	" "	7:08	"	51	He did not allow her to come near the box.
9	" "	3:37	"	5	
10	"-17	15:	Failed		Not very hungry.
11	"-18	15:	"	8	efforts by female.
12	" "	4:25	Female Jay	1	In same way as male. The only sign of imitation in the series.
13	" "	:35	Male Jay	1	
14	" "	1:20	"	1	
15	" "	2:22	"	11	Most of these incorrectly placed.
16	"-19	1:32	"	2	
17	" "	1:13	"	3	
18	" "	:48	"	1	
19	" "	3:10	"	7	
20	" "	1:08	"	6	
21	" "	3:13	"	3	
22	"-20	1:30	"	6	
23	" "	:30	"	1	
24	" "	2:25	"	8	
25	" "	:47	"	3	
26	"-21	:20	"	1	
27	" "	:47	"	1	
28	" "	:18	"	1	
29	" "	:12	"	1	
30	" "	:17	"	2	
31	"-22	:16	"	1	
32	" "	:17	"	1	
33	" "	:25	"	1	
34	" "	:24	"	1	
35	" "	:35	"	4	
36	"-23	:12	"	1	
37	" "	:18	"	1	
38	" "	:20	"	1	
39	" "	:18	"	1	
40	" "	:08	"	1	
41	" "	:27	"	2	
42	" "	:08	"	1	Returned twice to pull the string five times with door already open.
43	"-24	:12	"	1	
112	8-25	:05	"	11	Strings to left of door but opened through wire at old place. Five pulls after door opened.

TABLE X—*Continued*

Trial	Date	Time	Bird opening Box	Efforts of Bird opening Box and other behavior.
113	8-26	:20	Male Jay	2
114	"	:10	"	2 Two efforts on the strings to the left of the door but finally used old method in all the remaining trials.
115	"	:02	"	1
116	"	1:08	"	9
117	"-28	:10	"	1
125	9- 1	:25	"	6

Some of the extremely long times early in this series may also be due to the same fact that had to be kept in mind with the Crows. The Jays also store away their over-supply of food and they may not have been as hungry as one would infer from the period of time since they were last fed.

Knowing the use which the Blue Jay makes of his beak in the opening of nuts, etc., it was not surprising that he should use the same method as the Redheaded Woodpecker and the Crows were found to do in such a vigorous and persistent manner.

The female Jay showed very little tendency to imitate. She opened the door but once and this in the 13th test, though my notes several times make record of the fact that she might have done so if opportunity were all that was needed. It should be said, however, that during the first tests she really had little opportunity. The male was certainly a tyrant in this family. The female, as a rule, never entered the box to eat until the male had satisfied his hunger and left. Not being allowed near the box at the start, she formed the habit of staying away, and this is directly inimical to imitation in later trials. She followed him to the box often, however, as indeed all the birds have done with each other.

In the 43rd trial the male for some reason left the box after taking only a few bits of food. He soon returned and, with the door already open, pulled the string three times. He then went to the top of the box, but did the same thing twice more on his next approach. In the 112th trial he again repeated the same action under exactly similar conditions five times. He did, therefore, what the other birds, most of them, have been seen to do.

By the 60th trial this Jay has probably learned to open this box as readily and easily as he ever will. The table, therefore, omits the results of tests 44 to 58 and 60 to 109 inclusive.

For the 110th test the strings were transferred to the left of the door. The Jay struck twice on place 1, then hopped up on the wire at the same place, then twice on the strings in

their new position, place 2, and lastly seven in place 1 where he succeeded by reaching through the wire in the old place and pulling up the latch. But once during the remainder of fifteen trials did he make use of the strings. It is evident from the number of efforts during these final tests that it is the place which is firmly fixed, or associated, for he will make a great many efforts through the wire on the thread or projecting end of the latch rather than work on the strings. These, too, have only been changed to the left of the door and they are very conspicuous.

We get, then, from this series proof of the ability of the Blue Jay to learn. This he may do somewhat more rapidly than some other birds, but really in very much the same way. As proof of imitation we get very little as compared with some of the other groups of birds. But in these instances there would seem to be that which one may sometimes get from negative results. This male Jay had no rival, he was not as cautious as the Old Crow and the male English Sparrow, and there were no long intervals of waiting as with the latter and the Cowbird.

Series I.

Tests with Food-box on two male Baltimore Orioles, three Cowbirds,—two males and one female,—and two young English Sparrows.

At the beginning of the present series there was but one male Oriole present. The young English Sparrows, though they were partly reared by hand, were so wild that they did not approach the food-box at all in the early tests. It is true they could not be expected to cope successfully with the mature birds of the larger species, and yet if at all hungry they could at times take care of themselves surprisingly well.

During the first four trials, and once following this, one of the male Cowbirds opened the door. In this series these initial times are relatively short. This is probably due to the fact that the strings were rather easily worked and the birds rather hungrier than in some of the other series. The Cowbird's method was one somewhat peculiar to this bird, though not entirely so. He lifted one foot and clawed the lower strings. In the second test he must first fight off the Oriole. Close observation showed that the latter might be outclassed as a fighter, but would not necessarily be driven off. He would open his mouth, express his emotional state in rapidly succeeding cries, fall back on his haunches, and stand his ground. In the 4th trial the same Cowbird changed his method and used his beak on the string.

In the 5th test the Oriole took his turn, but in an obviously

accidental manner. It is, of course, understood that all these first successes are accidental. In this case it will be easily seen it was if possible more so. In flying to the top on the front side of the box the Oriole slipped off and struck the top-most string. He succeeded in the next trial by using his foot on the lower string. The 7th trial required an inordinately long time and his final method is far removed from the simplest way in which the door may be opened. What he did was to put the beak through the wire and pull the black threads which run vertically from the latch in order that they may be attached to the outside strings. A most indirect method, one which

TABLE XI

Tests with Food-box on two male Baltimore Orioles, three Cowbirds and two young English Sparrows.

Trial	Date	Time	Bird opening Box	Efforts by bird opening Box	and other behavior
1	7-21	:40	Male Cowbird		By stepping on lowest string.
2	"-"	3:55	" "		By stepping on lowest string. Oriole 1 must be driven away.
3	"-"	6:15	" "		By stepping on lowest string. Oriole 1 must be driven away.
4	"-22	5:28	" "	7	Pecked at each end of latch. Cowbirds afraid. One eye turned toward sky.
5	"-"	5:20	Oriole 1		Struck top string in going to top of box. Young English Sparrows very wild though reared by hand.
6	"-"	1:50	"		By foot on string.
7	"-"	8:38	"		By beak through wire mesh on threads. Oriole 1 chased Cowbird away.
10	"-23	23:58	"	24	Cowbird chased away nine times.
11	"-"	5: 3	"	14	Cowbirds not down.
12	"-"	4:15	"	14	Oriole opened by pulling knot on lowest string.
13	"-"	1:55	"	1	
14	"-24	3:43	Cowbird	3	In same way as he did in 4 above. Oriole 1 made two efforts through wire at threads.
15	"-"	4:40	Oriole 1	7	Oriole 1 opened through wire.
18	"-"	1:28	"	10	9 of which were on threads with beak
30	"-29	1:	"	13	Oriole opened by working string B on outside.
31	"-"	:20	"	1	Returned to old method.

TABLE XI—*Continued*

Trial	Date	Time	Bird opening Box		Efforts by bird opening Box and other behavior.
40	8- 1	2:47	Oriole 1		41 Oriole finally opened by striking outer string B.
41	"-"	:52	"		4 Beak on end of latch.
48	"- 4	:57	"		3 A second male Oriole in cage. He was clearly master. Made many efforts.
49	"- 5	:23	"		3
50	"-"	:12	"		1
51	"-"	1:10	"		2 Oriole 2 much in the way. O. 2 after O. 1 has entered made some 10 efforts very like those of O. 1.
52	"- 6	:28	"		3
53	"-"	1:25	"		3 O. 2 entered first. O. 1 pulled strings 4 times with door open and O. 2 inside.
54	"-"	:27	"		1 O. 1 pulled strings 3 times with door open.
55	"-"	:15	Oriole 2		By standing on string 1 and striking on 2.
56	"- 7	:47	"		By striking. O. 1 driven away just as he was opening door.
57	"-"	1:	"	1	In his old way.
58	"-"	2:	"	2	By flying on string D. O. 1 driven away.
59	"- 7	:51	"	2	By flying up on string D.
63	"- 8	:48	"	2	By accident. O. 2 slipped off post and struck string C.
64	"-"	:12	"	1	In his old way. O. 2 followed up the accident of last time and missed.
65	"- 9	:15	"	1	In his old way Same as before.
66	"-"	:41	"	2	5 All at strings C and D.
67	"-10	2:02	"	2	6 Many of these efforts were made by following up the accident.
68	"-"	:04	"	2	1 on string D.
69	"-"	:33	"	2	5 went to post, thence to string D.
72	"-11	4:12	"	1	O. 1, 15 trials. O. 2 8. Something wrong with box. O. 1 opened in old way but went to post once as O. 2 did often.
73	"-"	:27	"	1	O. 2 was clinging to door when it opened.
74	"-"	3:45	"	2	6 O. 2 to post once and on door 5 times. O. 2 to string C from door.

TABLE XI—*Continued*

Trial	Date	Time	Bird opening Box		Efforts by bird opening box and other behaxior.
76	8-12	:23	Oriole	2	5 efforts, 4 on door.
77	"-"	:03	"	2	From ground to string C.
83	"-15	:05	"	2	O. 2 from door to string C.
89	"-25	:20	"	1	Strings changed. Opened in old way. O. 1 followed O. 2 on door.
90	"-25	:30	"	1	O. 1 in old way. O. 1 again follows O. 2 to where string should be.
91	"-26	:15	"	1	O. 2 made many trials.
92	"-"	:15	"	1	O. 2 made many trials. O. 1 made two efforts like O. 2.
93	"-"	:03	"	1	2 efforts in old way.
94	"-"	:15	"	1	3 efforts in old way.
95	"-"	:15	"	1	15 in old way.
101	"-29	:05	"	2	1 on string C.
102	"-"	:25	"	1	3 O. 2 made 1 effort on left of door.
103	"-30	:28	"	1	11 efforts. O. 2 made 1 effort on left of door.
104	"-30	:10	"	1	5 Some tendency in O. 2 to use bill.
105	"-31	:05	"	1	2 O. 2 to left of door.
106	"-"	:07	"	1	1 O. 1 showed tendency to follow O. 2.
109	9- 1	:08	"	1	1

we shall later find the Crows using, and a method that may give the experimenter both positive and negative results for which he has not reckoned.

By the 9th trial the Oriole constantly chased the Cowbirds away from the box. On the 14th test the same male Cowbird opened the door with the beak on the end of the latch by reaching through the wire mesh. As he did this but once it can hardly be counted as a good example of imitation.

For the 48th and succeeding trials the second male Oriole was placed in the cage. It was evident at once that he was more pugnacious than Oriole 1. There was no doubt that he would be ruler of this cage in a short time. He made efforts to get into the food-box during this his first trial. Three tests later, after Oriole 1 had opened the door in his usual manner (by reaching the beak through the wire mesh and pulling threads), the behavior of Oriole 2 was most significant. He made many of the same kind of efforts as Oriole 1 had just made but the latter was inside eating and the door was open.

Oriole 1 continued to open the door for three more trials. In the 53rd Oriole 2 entered first and Oriole 1 pulled the threads fourteen times with the door standing open. In the following

test he did the same thing four times under similar conditions.

There now began that period of alternation which has happened in previous series in which first one then the other was successful. The first method of Oriole 2 was to stand on the lower string and strike the one just above. Several times Oriole 1 was chased away just as he was on the point of pulling the threads. In the following trials Oriole 2 was successful by flying up on strings near the top. It is evident that if he did imitate it was not for long. Flying up and pushing the top string is certainly not an imitation of Oriole 1 in his reaching through and pulling the threads. The number of efforts required of Oriole 2 at this stage would indicate that he had not yet singled out the single part and only that which must be worked.

The 62d test gave interesting proof of the statement just made. Oriole 2 alighted on the post just above the outer end of string C. In an apparently accidental manner he slipped from the post and struck this string and the door opened. Would he use this method in the following trials? I was watching for him with camera focused and the accompanying figure, 17, was the result. His erroneous association and the efforts which he made to operate the strings by merely alighting on this post was what allowed Oriole 1 to step in and be successful during the following two trials. This, too, in face of the fact that Oriole 2 was the first at the box. In the later trials the latter would often go to the post and thence up to the top string.

Usually in learning tests with animals it is unfortunate if the fastenings of the food-box fail to work as easily or in the same way as they have in the past. Yet as we shall see directly for these Orioles and later for the Crows, such an accident in tests on imitation is really a favorable occurrence. Reference to Table XI will show that the time is greatly lengthened for the 70th and 72d tests. It was evident that there was something wrong with the box. Oriole 1 was successful only after fifteen attempts, all save one of these being on the threads. Oriole 2 made eight attempts at hopping on the post and Oriole 1 made one such attempt. Apparently in imitation of Oriole 2, and in a very sudden and impulsive manner. In the 71st trial Oriole 1 opened while at the same time Oriole 2 was hanging to the door. What was the effect of this in the next trial? The length of time in this next trial is due partly to the fact that Oriole 2 must hop on the door five times. In fact he left the door to go directly to string C, Fig. 18. Again something entirely unnecessary becomes to this bird an important link in the association series because his hopping on

the door was simultaneous with the pulling of the thread by Oriole 1.

For the 87th test the strings were removed from the right and placed in the niche to the left of the door, place 2, Fig. 19. Oriole 2 was on the door and went thence to where string C used to be. Oriole 1 opened in his usual way by pulling the threads. In changing the outside strings to the left of the door I had, of course, intended to modify the box for Oriole 2. At any rate if we failed to get results on the readiness with which Oriole 2 could do as the female English Sparrow did in series A, we did get some slight indications of imitation of Oriole 2 by Oriole 1. It was very similar to the result obtained a little earlier in this series. In the following test there was likewise a single indication of imitation.

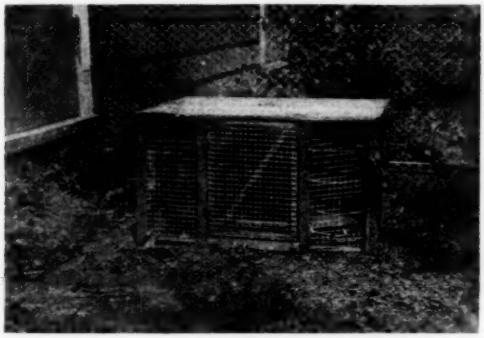

FIG. 17

Male Baltimore Oriole 2. He, during an earlier trial, flew to this post, slipped off, struck String C and opened the door. He is shown here continuing this wholly unnecessary action.

For the remainder of this series Oriole 1 continued to open the door. Oriole 2 to all appearances saw him, but as they began to moult badly I did not improve the mechanism as I did later for the Crows in order to compel just one method of gaining entrance to the box. It is probable that these Orioles, had the tests been continued, would have given much better evidence of the power of imitation.

Great interest naturally attaches itself to these tests for the reason that at least one popular writer on the Baltimore Oriole has found it capable of very remarkable performances. It is said to resort to measures distinctive of an adult human being in arranging supports for its nests and in the tying of knots in

strings used for such supports. Indeed many human beings would be incapable of what was reported of this pair of Golden Robins.

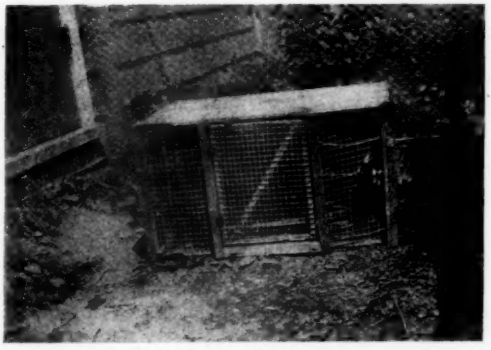

FIG. 18

Male Baltimore Oriole 2 as he came to open the door after many other attempts.

FIG. 19

The strings are to the left of the door, Place 2. Male Baltimore Oriole 2, instead of working the strings in the new position, tried the old place, failed, and was here watching Oriole 1 reach through the wire as the latter was accustomed to do earlier.

The writer has been much interested in the many abortive attempts of pairs of Baltimore Orioles to build their nest in the

cages of the aviary where the above tests were made. When supplied with much material which they may naturally be expected to use, all their nests are imperfect, some much more so than others. It may be seen that in all of them an attempt is made to adhere pretty closely to the nest so typical of this species so many of which are found on the slender elm branches over our streets and sidewalks. Not a single observation on many such imperfect nests for a number of years would go far to corroborate the above remarkable findings with respect to nest building. Such astonishing results would for their satisfactory explanation require reasoning in these Orioles. The present pertinent query is,—Did the two male Orioles who were submitted to all the above tests show any signs of any mental power above that of intelligence or the "trial and success" method of learning? It should be said in this connection that to infer from an isolated single instance that any animal reasons or does not reason is a method hardly to be tolerated in our present science of Animal Behavior. In fact, the study of human reason requires a series of tests with the same problem or situation from day to day.

In the above tests it is clearly evident that each bird, the male Cowbird, then Oriole 1 and lastly Oriole 2, first learned by accident how to operate the fastenings and in his own way. Even after Oriole 2 had done the right thing for a number of times a little accident led him astray. In so far as there is imitation it is shown by Oriole 1 when he copied certain actions of Oriole 2 which were never calculated to bring any results. They were errors on the part of the latter. As such they were imitated very suddenly and impulsively. Such imitation could hardly be rational or reflective. Intelligent it may be. Again, if there is any reasoning in all this ought not Oriole 2 have opened the door when the strings were changed from the right to the left side? He had worked the strings on the right side but twenty-six times all told. He certainly could not have formed so fixed a habit that all his power to reason, if he had any, was made as if it were not by habit. Truly these Orioles fall into the same class with all other animals which have been subjected to careful continuous investigation which exhibits to us the origin and development of the learning process. They learn gradually to perform just that act which rather directly brings the pleasurable result. The writer does not know of any series of experiments which are better calculated than these with the Orioles to illustrate the direct following up of acts which by merest accidents brought the bird to the food. Such, it seems to me, is the correct interpretation to place upon the results embodied in the present section of this paper.

Series J.

Intelligence and Imitation in Crows as Determined by Tests in Opening the Food-box.

The old Crow, Jim, with which my first work on Crows began had been in possession of Mr. Worthington for some five or six years. His wings had been clipped and most of the time he was to be found in some part of the large lawn. For a year or more he had been confined to a large wire cage. He was very wary. Even an acquaintance must exercise care in pulling Jim's beak or scratching his head for at such times he was apt to use his bill with painful results.

It should be added that the sex of this bird as well as that of the young crows was not known. If they are referred to as males it is only in an impersonal way and analogous to what we do with many other animals as well as inanimate objects.

On rare occasions Jim could be induced to swell himself up very much and apparently with the greatest effort give utterance to something which sounded like a muffled "Hello." The presence of ladies seemed to furnish a stimulus better calculated to call forth this one expression—Jim's whole vocabulary. I could more frequently induce him to imitate me in saying this word by having a white towel in my hand. It seemed to me that the ladies wearing white could best get Jim to show off his one accomplishment.

As remarked above Jim was most cautious and wary. Any new object placed in his cage he was most slow to make use of. How then was I to determine how rapidly he could learn to open my food-box. I began with him somewhat gradually. On the twelfth of June I made a box like that shown in Fig. 21. To begin with I left off the door as well as the wire from the left end and front of the box. Would Jim eat from the pan placed just inside the door? Not a bit of it. When his food supply was abundant he always hid all that he could not eat. It was hardly ever possible, therefore, to know exactly when you had cut off his supply. Yet in this case I had to coax him nearer and nearer the box by placing the pan well in front and by degrees nearer. Finally I starved him into approaching near enough to stand on tip-toe, stretch his neck, and very suddenly take a bit of food from the pan inside. As an extra inducement I often placed in the pan half a hen's egg of which he seemed to be very fond. With each addition of wire, door, or strings he had to be given time to overcome a new lot of caution.

On July twenty-fourth, about six weeks after I first placed the box inside the cage, my first test was made. The box with door closed was placed in at 2.31 P. M. After forty trials, which

he began to make after the box had been in about two hours, he opened the box by pulling the second string with his beak. Most of his trials were pecks on the wire eyelets by which the strings were attached to the post at the right corner. It was most amusing to see him peck at these and the wire and then in a savage manner pull up great bunches of grass. After the door was opened seven minutes were required for him to take a bit of food from the pan just inside the door.

On the 2d test seven minutes were required and twenty-nine efforts. The 3rd and 4th tests were failures for the reason, largely, that he was not hungry enough. The cause of this was that he had stolen a rat from the caretaker while the latter was feeding the Sparrow-hawk.

From the accompanying table (XII) it may be seen that this Crow like the other birds learned rapidly once he began. He was given more trials per day than most of the others. His many efforts were perhaps due to the fact that his fright caused him to attempt to strike when he was too far off to do so accurately.

On the 20th test he returned to the perch at once on opening the door. Almost immediately he returned to pull the first string some nine times and this with the door already open. On the preceding day he did this once as I started to remove the box from the cage. On the following day, July 30th, he did it four times during one trial. On July 31st,

TABLE XII

Results of experiments on three Crows with a Food-box similar to that used in all the Previous Series.

Trial	Date	Time	Bird opening door	Efforts of Bird opening door and other behavior
1	7-24	34:	Old Crow	40 made first effort after 2 hours. By pulling string B with beak.
2	"-25	7:	"	29
3	"-"	56:	"	94 Failed.
4	"-26	34:	"	3 "
5	"-"	:15	"	3
6	"-27	15:30	"	50
7	"-"	:30	"	6 Most on box and wire.
8	"-"	:30	"	25 Struck at wire eyelets.
9	"-"	1:	"	23 Too frightened to pull hard enough.
18	"-29	:15	"	9 Pulled string with door already open.
19	"-"	:10	"	5
20	"-"	:13	"	4
21	"-"	:13	"	5 Efforts now confined to string E.
22	"-30	:17	"	4 Returned twice and pulled string five times with door open.

TABLE XII—*Continued*

Trial	Date	Time	Bird opening door	Efforts of Bird opening door and other behavior.
23	7-30	:05	Old Crow	2
30	"-31	:40	"	4 Pulled string twice with door open.
33	"-"	:05	"	2 Pulled string twice with door open.
39	8- 1	:05	"	1 Pulled so viciously that string came off.
51	"- 3	:08	"	1 Again pulled string with door open.
52	"- 4	:12	"	2 Young Crow 1 in with old Crow from this on.
53	"-"	:09	"	1
54	"-"	:10	"	1 Young Crow cautious though reared by hand.
60	"- 5	:10	"	1 Food in left front corner. Change was noted but no effect on behavior.
61	"-"	:06	"	1 " " " "
62	"-"	:04	"	1 Food now in left rear corner. No effect.
65	"- 6	:07	"	1 Pulled string with door open six times. Young Crow made first efforts.
66	"-"	:05	"	1 Pulled string with door open.
69	"-"	17:35	Failed	7 String now to left of door.
70	"- 7	10:	"	15 Young Crow 1 to top of box several times.
71	"-"	10:	"	3 Young Crow played a great deal with all parts of box.
72	"-"	4:25	Young Crow 1	1 By accident. Old Crow 3 efforts.
73	"-"	5:45	Old Crow	1 effort to left of door. 38 efforts on old side.
74	"- 8	11:20	"	1 to left of door. 17 on old side.
75	"-"	1.32	"	3 All efforts correctly placed to left of door.
76	"-"	4:15	"	16 " " " "
81	"- 9	1:17	"	2 correctly placed. 11 on old side.
84	"-10	6:03	"	1 Camera in position disturbed him.
85	"-10	7:05	"	1 A painted turtle that had opened the box twice tried again.
110	"-23	2:20	Young Crow 1	3 Pulled top string from top of box. A five day interval between tests.
111	"-"	1:	Old Crow	1
112	"-"	1:50	Young Crow 1	1 Many pulls on the rubber band.
113	"-24	:05	Old Crow	1

TABLE XII—*Continued*

Trial	Date	Time	Bird opening door	Efforts of Bird opening door and other behavior.
114	8-24	:20	Old Crow	2 Strings to left end just round the corner. No efforts by Old Crow in old place.
118	"-25	:40	Young Crow 1	
119	"-"	:50	"	1 Old Crow struck and missed when young Crow pulled same string. Young Crow closes door often by swinging on it.
120	"-26	:15	Old Crow	1
121	"-"	:55	Young Crow 1	Many efforts all over box. He never ate out of pan. Always waited until I fed him.
122	"-"	:10	Both	Both struck at same time.
123	"-"	:06	Old Crow	1
124	"-"	1:25	Young Crow 1	6
125	"-27	:07	Old Crow	1
126	"-28	:05	"	1
127	"-"	:46	Young Crow 1	
128	"-"	:05	Old Crow	1
129	"-29	:05	Young Crow 1	
130	"-"	:52	"	Old Crow one effort when young Crow 1 came and opened.
131	"-"	:15	Old Crow	1
132	"-30	:30	Young Crow 1	1
133	"-"	1:55	"	3 efforts by Old when Young opened.
134	"-"	:10	"	From ground as Old Crow.
135	"-31	:08	Old Crow	1
136	"-"	2:04	"	2 Strings to rear corner of left end.
137	9- 1	:45	Young Crow 1	1 He searched first for strings in old place.
138	"-"	2:	"	25 Old Crow struck once in 3rd place.
139	"- 2	1:18	"	12 Old Crow 3 in second place.
140	"-"	1:30	Young Crow 2	Many efforts. Continued to pull after door opened.
141	"- 3	7:15	Young Crow 1	Old Crow made 62 efforts. most on door. Very like Young Crow 1
142	"-"	:45	" 2	3
143	"- 4	6:20	Failed	Old Crow struck 17 times at door and rubber band.
144	"-"	:20	Young Crow 2	
145	"- 5	5:30	Old Crow	2 Raining.
146	"-"	1:	"	2 Efforts at door.
147	"-"	:45	"	
148	"- 6	:12	Young Crow 1	
154	"-"	:10	Old Crow	1
155	"- 7	:06	Young Crow 1	
158	"-"	:15	Old Crow	1

TABLE XII—*Continued*

Trial	Date	Time	Bird opening door	Efforts of bird opening door and other behavior.
159	9- 8	:10	Old Crow	1 Young Crow 1 pulled string at once after Old Crow had opened.
160	"-"	1:16	Young Crow 1	
161	"-"	:13	Old Crow	2
163	"-"	: 1	Young Crow 1	11
165	"- 9	:06	Old Crow	1
168	"-"	:30	Young Crow 1	
169	"-"	3:25	"	1 Frightened by wire and posts which replaced boards on rear side.
170	"-"	:50	"	
171	"-"	:25	"	
172	"-"	:15	Old Crow	1 Strings to rear side right corner for next test.
173	"-"	:50	Young Crow 1	.6 By pushing bill through front side. Old Crow strongly inclined to work on left side.
174	"-"	1:30	Old Crow	33 He struck as Young Crow in previous trials and opened in same manner.
175	"-"	1:40	"	2 hard blows on door.
176	"-"	3:30	Young Crow 1	Lifted door up with claws. Old Crow made 15 efforts in front.
177	"-10	3:	"	Lifted door up with claws. Old Crow 30 efforts in front.
178	"-"	3:50	"	1 correctly placed. Many otherwise.
179	"-"	1:30	"	By striking through wire at end of latch. Old Crow 15 efforts in front.
180	"-"	1:05	"	Correctly placed.
181	"-"	2:	"	Many efforts in front.
199	"-15	1:30	"	1 Young Crow is fed and old allowed to get hungry. Old Crow made one attempt but failed.
200	"-"	:50	Old Crow	1 From preceding test to close, the Old Crow is often induced to open door by feeding Young Crow 1 preceding each test.
201	"-"	:30	Young Crow 1	1 with foot.
203	"-17	4:	Old Crow	Many trials necessary.
205	"-18	: 5	Young Crow 1	1
206	"-"	1:50	Old Crow	4 Came round from rear often to see if door had been opened by efforts just made.
207	"-19	2:30	Young Crow 1	With foot.
208	"-"	:10	Old Crow	
214	"-21	:10	"	

again once each in two different tests, twice again on Aug. 3rd, and again on Aug. 6th. On Aug. 6th the pan of food was removed from just behind the strings to the front left corner. He noted the change but it did not affect his behavior. After three tests the food was placed in the left rear corner but this again made no change in his behavior. It is understood, of course, that each time after the door was opened I placed the food out next the door-sill so that Jim could get it. He would probably starve before entering the box.

On August 5th one of two young crows that were taken from the nest about the first of June and reared by hand was turned into the cage with Jim. The accompanying figure 20, gives a good idea of the tameness of these crows, and yet they were, when a month or so old, somewhat more fearful than as shown in the photograph. If a stranger fed them they might refuse to eat from his hand until very hungry. This young one, which we shall designate as Young Crow 1, was at first inclined to be rather cautious in his approach to the box. On the second day, however, he struck at the wire and nail heads.

On this same day the strings were removed from their place at the right of the door, place 1, and placed to the left of the door, place 2. This change was identical with that made in the box for the birds in Series A and others. It will be seen from the table that nothing was done during seventeen and one-half minutes except some efforts on the wire eyelets where the old strings had been attached. In the 2nd test Jim made fifteen unsuccessful trials in ten minutes and then returned to his perch. In the following trial of ten minutes Young Crow 1 played a good deal on top of the box. The young crows had shown signs of play when in their own cage. Jim made three unsuccessful efforts, but failed in ten minutes. Young Crow 1 opened the door by pulling the top string when standing on top of the box. Jim had already made five attempts during this trial. In the succeeding trial Jim worked very hard. He was successful only after making forty-eight vain efforts on the old side. He seemed to have very strong associations with the old place and not for the strings. The box is so made that the door swings back against these strings. Jim's great fear may well have been increased by this fact. The time required for the next trial was longer. Seventeen errors, all made by working on the old place, were recorded against Jim in this trial. Young Crow 1 was working on the top of the door. He struck it with the beak and jumped back suddenly each time.

By this time Jim showed signs of learning to work on the strings in the new position. There was some little interruption during a few tests at about this time. This was caused by the

FIG. 20

The two Young Crows as they were usually fed. Such tameness was to be had as they grew older only with the most constant feeding and by the one person who cared for them.

fact that a turtle had been eating from the pan which contained the bird food, and in fact opened the door a few times by crawling up between the strings and the wire.

The Young Crow 1 worked at the box a great deal. He seemed to enjoy pulling and tugging at the rubber band which

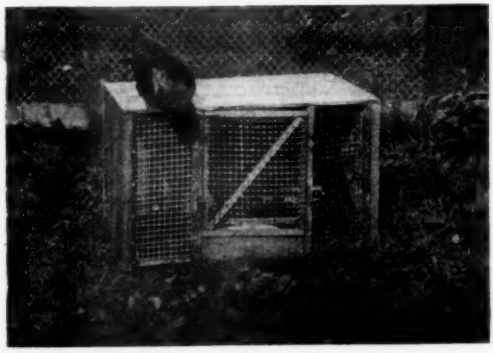

FIG. 21

The strings were now in Place 4 on left end. Young Crow 1 is shown here as he happened to find a way to open the door which I had not foreseen. He pushed his beak through the wire and pulled the strings as they run from the latch to Place 4. See the text (p. 63) for the effect of this on the Old Crow.

was used to pull the door open when the latch was raised. He had opened the door some three times in all prior to the 123rd test. At this time the strings were removed to the niche in the left end, place 3, but just around the corner from where they were. As may be seen from the results, Jim made this transition with very little if any difficulty. He continued to do so for four more tests when Young Crow 1 opened the door from the top of the box. In the next Jim struck at the string but missed, when Young Crow 1 at once pulled the same string. Both worked at exactly the same time in the third trial following. In succeeding trials the Young Crow often opened only after Jim had made one attempt.

On the 146th trial the strings were changed to the rear position on the left end. Jim opened the first time, but had to make three different approaches. He looked for the strjngs in the old position, as did the Young Crow 1 in the next trial, before working them in the new location. In the next two trials Jim made attempts on the old positions.

From the standpoint of imitation the results of this series now come to be more interesting. Young Crow 1 pecked at the top of the door a great deal. Young Crow 2 had now been placed in the cage. Jim struck the door sixty-two times or until Young Crow 1 pulled the string and opened it. The extent to which the latter understood what he was doing may be guessed from the fact that he went on pulling after the door was open. Young Crow 2 was successful next time, and he, too, continued to pull as the other had done. In the next Jim made seventeen errors by working on the door and the rubber band.

Several trials later Young Crow 1 stood on the ground and opened the door as Jim did. It is very difficult to classify this as imitation, though he did it a number of times, for the reason that this crow was so versatile. He did everything to the box in every way in which he could peck or pull at any part of it. He even went so far as to stand on the ground and pull the same string as Jim. Inasmuch as he had the same day stood on top and struck at the top string immediately after Jim opened by using the lower string we may call it imitation according to the more difficult criterion. It involved a change from previous behavior.

In order to make a place for the strings on the rear side of the box so that this series should correspond exactly with that on the Sparrows, etc., Series A, the boards were removed and posts and wire were put in on the rear, Fig. 22. This change made Jim and even Young Crow 1 afraid whenever they caught sight of the wire. This caused the times to be somewhat longer.

For the 4th trial following this change the strings were placed on the rear at the right corner. There now occurred a fortunate conjunction of circumstances more than once which has given me my best results on the subject of imitation in birds. Instead of opening the door as I meant for him to do, Young Crow 1, after about a dozen efforts, put the beak through the wire just to the right of the door in front and pulled one of the strings running vertically from the latch to the under surface of the top of the box, Fig. 21. The door opened and following his playful habit he jumped to the top

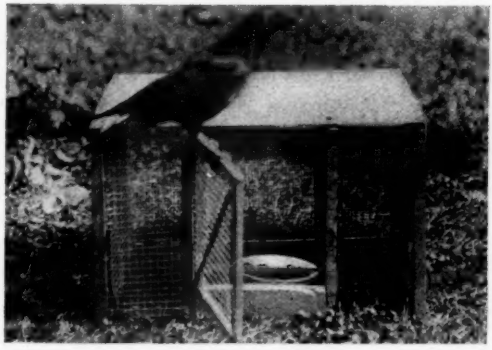

FIG. 22

Young Crow 1 at his favorite play with the box. He was swinging on the door. When he jumped off the door usually closed and he or the Old Crow must open again. This is important for it brings the tests in rapid succession, a very favorable condition for imitation.

of the door and swung back and forth a few times, Fig. 23. In hopping off the door, as he always did in a few seconds, he closed it and thus made possible another test *at once* after Jim had seen him open the door from in front. In spite of the fact that Jim had shown strong inclination to go to the left end, he now made most of his thirty efforts on the front and really succeeded in opening the door in the same way as the young one had done. In the next trial Jim opened by two hard blows on the door itself, for I had placed the strings so that they could not be reached through the wire.

For the following trial I had changed the box so that the door did not open so easily by striking against it. However, Jim struck it fifteen times and the Young Crow 1 outwitted me again by pure accident in lifting the door up when his claws extended over the edge of the box and caught in the upper

edge of the door. In the following trial Young Crow 1 opened in much the same indirect manner with the claws, but only after Jim had made thirty efforts with his bill. Again there were many efforts on the door, but this trial the young one pulled the strings as he should. This was followed by a test in which Jim made about fifteen unsuccessful efforts with his beak, but Young Crow 1 succeeded by striking through the wire at the left end of the latch. Previous to this I had changed the box so that no amount of pecking could open it, but now I had to cut off the end of the latch so that it did not extend out from the post to which the door was hung. From the fact that in the next trial this Young Crow 1 made many attempts on the door and front of the box, we infer that his records would give us a good curve of learning did he not alternate so much with Jim and were there not so many conditions necessary for Jim and tests for imitation, which were hardly calculated to permit of good results for the Young Crow 1 as a subject of mere learning tests.

From this point on to the close of these tests this Young Crow 1 opened the box except when he was fed just preceding each test and Jim was allowed to go hungry. Even then the former would sometimes be the first to perform the necessary act. See Fig. 23. This would indicate that his opening the box was often a result of what we might term his playful activity.

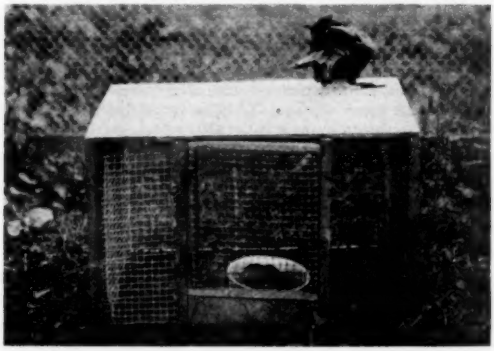

FIG. 23

Young Crow 1 shown opening the door by pulling String C in Place 5. The Old Crow was induced later to work in this place, but did so in his own way. The Young Crow was fed from the hand just before each test and as a rule made no attempts to open the box.

It is of interest to note that when Jim made a rapid but un-

successful pass at the string, he would often run around to the door, evidently expecting that his act had brought the desired result.

It would seem that in the present series there was a happy conjunction of just those factors needed to call forth imitation. May we not say that these are just the conditions and factors which render the experiment less artificial and less far removed from those natural conditions in which so many have taken it for granted that intelligent imitation did find a large place? The present writer is persuaded that what he needs with other birds and animals is a more or less exact duplication of the conditions which obtained with these crows.

Jim followed the example given by young Crow 1. He did not simply perform an act in the same way as his model did but in that part of the box worked upon as well as the definite things done he was seen to go against an old habit, against that which he was strongly inclined to do. He did so probably because previous methods of his own had brought the desired result.

Without great caution on the part of this older bird, frequent changes in the fastenings on the box, without the incessant playful efforts on the part of the young crow, indeed, without the imperfections in the box which made it possible to open it in an unexpected way, it is difficult to see how such a clear case of imitation could have been obtained. That this is the best series which the present writer has to submit is largely due to results unforeseen but which nevertheless may serve us all the better as proof of that which we were in search of. But it may be said that many of the changes which the Old Crow made in his behavior were simple reversions to a previous method of his own. True this may be in many cases and yet this very point is involved if we analyze the conditions necessary for the appearance of imitation. Where could the idea or impulse of the movement to be made in imitation come from if the animal or child had had no previous experience of its own to use at least as a basis. In an important way this previous experience is just what has not been given to animals by earlier students of imitation. The lack of this previous experience in sufficient amount is perhaps the chief reason for the fact that it is some months—four to six—before the higher stages of imitation appear in the human child.

VI. Discussion of Results

The origin and development of social life in the animal as well as in the human world have long been considered problems by scientists, whether biologists, sociologists, psychologists, or educators. Imitation of some kind or other, all

would agree, constitutes one and only one of the chief factors in this problem. The interpretation of our findings, stated in the previous sections, may be dealt with briefly here.

Let us consider the different kinds of imitation. Principal Morgan, that peerless thinker in the problems of Animal Behavior, has proposed the following:

(1) Mimicry, which lies below the level of imitation and which (the present writer would add) is determined by forces wholly outside the individual. Mimicry is determined for the individual in the previous history, or, let us say, experience of the species, either through environmental or organic conditions. Some recent investigations give promise of serious revision of our thought with reference to just why the walking-stick, for example, is so like the branch on which it is found. At any rate, it is the experience working through natural selections and other ways, and not at all necessarily through transmission of acquired characters, that pre-determines Mimicry in the individual. The reason for the writer's use of the word experience will appear later.

(2) Instictive Imitation. This is again inherited though now the emphasis, because of the meaning of the word "Instinctive," is on function rather than structure. Partly because it is function rather than structure, but also because of the nature of the external stimulus which sets the instinct going, it is to be expected that what the individual imitates instinctively will not be copied in so fixed a manner as mimicry demands. There will be a good deal of the individual in it. Nevertheless such instinctive imitation is done readily and automatically, and is determined by the experience of the species. It belongs in the same class with mimicry, but offers more of plasticity of action to the individual. They therefore have the same relation as Hobhouse has pointed out for Reflex Action and Instinct. Examples of instinctive imitation are to be found in the "following instinct," which is very well illustrated by the observations described on page 6. Many, if not all, of the instances of imitations of song in birds are examples of instinctive imitation. The calls and songs of birds are very intimately associated with the mating as well as other instincts. Some of these might well become intelligent after being performed the first few times.

(3) Intelligent Imitation. Until the appearance of his most recent work on Animal Behavior this formed the last and highest part of Morgan's classification. In this book, however, this author makes a distinction which the present writer deems most necessary and useful, but which needs to be carried further.

All other earlier writers separate too widely instinctive and

intelligent imitation. Most have made intelligent imitation synonymous with "reflective," "intentional," "voluntary," "persistent" and hence this wide separation was very natural and even necessary. Inasmuch as students of animal psychology have agreed to use intelligence to mean "profiting by experience," and not reason, it would seem that intelligent imitation should be kept apart from the words which seem to imply in the animal mind something which is akin to, if not identical with, reasoning. The writer then proposes, and this is done chiefly because the facts seem to require it, as a third class that of intelligent imitation.

(4) Reflective, Intentional or Voluntary. This class involves an analysis of which, as can be shown, the bird is not capable. At least the observations which I have made would seriously call it in question. Such are those errors which have occurred in almost every one of the series described—pulling the strings repeatedly with the door already open, the indirect method used by the White-throated Sparrow, the errors of the Bluebird even in the Memory series, the errors and following up of misleading acts by the Orioles and Crows, etc. A fuller discussion of the significance of these facts would be both interesting and profitable in affording us an insight into bird mind, but it is hardly necessary here.

We have seen that mimicry and instinctive imitation are predetermined for the individual by the experience of the species. Has it not been rather futile for us to expect that one animal should imitate another in the doing of some act which each individual animal must learn by the "trial and success" method and this only? Most students of animals agree that it is by individual experience that such a thing is first learned. Then here is a test such as pulling a string to open a door to get food, which is extremely artificial from the animal point of view. How artificial it is only those can appreciate who have observed the enormous number of different things birds will do before pulling such a string much less to imitate another's pulling it.

The criterion which is proposed, stated on page 8, makes the test more difficult for the animal. He must change his own method for that of another. All my work with birds would lead me to expect that each species will probably open the door, such as I have used most, in a few limited ways. One feels that the Cowbird will use the beak or stand on the floor and pull with one claw. Several English Sparrows who have been very wild have used the same method of flying out from the top of the box and barely alighting on the strings. Yet even this fear may be an incentive to their following a copy set by another bird, and changing from their former method to the

one to be imitated. If other higher animals such as House Mice were worked with, I should deem it very necessary to make it certain that odor could in no way be used as a constantly leading stimulus for the animal doing the imitating. With birds such precaution is hardly necessary. It is considerations such as these which seem to demand a change of method in order that we obtain attention and interest from the animals, make our experiments more natural, and use a criterion which is more rigid so that what we have left, after we have rejected all that does not measure up, shall be really true.

As is evident from the detailed results, we do get examples of intelligent imitation. I do not call it voluntary, reflective, rational, or intentional. If animals are intelligent but not rational, this is all that we should expect. Such imitation is as stupid, as blindly dictated by accident and satisfaction and discomfort, and as impulsive as the intelligent act *per se*.

The writer hopes at some later time to show that much of human learning is analogous, not necessarily homologous, with animal learning. Both learn by "trial and success," the happy accident and the painful result method. Indeed man does not reason by far as much as our popular notions concerning this question would lead us to suppose. If this is true, then imitation in children and the higher animals ought to bear some instructive analogies.

The writer has three children. One is now two years old, another nine years and another eleven. Child psychologists record the fact that imitation appears first in a noticeable way about the fifth month. They mean, of course, the appearance of reflective, or better perhaps, intelligent imitation. I have several observations on the youngest child for the fifth month and thereafter which show clearly as it seems to me, that her imitations took the form of those things, or closely similar to experiences, which I had noted she had been having in an entirely spontaneous way. She imitated the nine-year-old in producing a high tone long drawn out. But it was not until after several repetitions that she knew she was doing so. This knowledge was indicated by the quite marked change in facial expression. So with a half dozen other cases in which there were pretty clear signs of imitation. All were based on previous experience, however. It has been observed often, as no doubt has been done by many others, that the baby shows much more interest and attention to what is done by the sister nine years of age than to the behavior of adults.

After the child referred to above had performed the imitation a few times, each performance being followed by all kinds of approval by one or more adults, and renewed efforts to elicit more, there were signs of a consciousness on the child's part

which promised to cause such acts to become rapidly imitation of a reflective, voluntary or intentional kind. As they first occurred they were to me examples of intelligent imitations, prepared for by the child's own experience.

It may not be amiss to ask what it is which characterizes those acts which adult persons imitate in an unreflective way? Does the preparation we have had, the previous experience, have the same effect as we think it has for these birds, only for the latter in a far more restricted manner?

There are, then, many reasons for believing that it is possible by giving a bird previous experience with the object to be worked with to get that sort of imitation which may be called intelligent. This probably is on a little higher level than instinctive, and yet does not mean the same as reflective, intentional, or voluntary. The writer hastens to say, however, that he really believes that any classification of the above kind does not adequately represent the facts. The observed facts in the animal are of all stages of instinctive and intelligent and in the child these two are not left behind when they emerge into the reflective. In this instinctive basis we find a satisfactory explanation of the facts concerning imitation in bird songs. There is probably no distinction to be made here between that which is instinctive from that which is intelligent. Were it possible to come to the bird with an act for it to imitate, which would appeal as naturally, spontaneously and repeatedly as these call notes and songs do, then we should probably get intelligent imitation as unmistakably and easily. This is difficult, but the writer feels that with the long series of tests under the conditions imposed and the demands of the more difficult criterion, we may be more certain of getting examples of intelligent imitation; but hardly that which is distinctively human, —the reflective, intentional or voluntary.

VIII. Summary

1. Several long additional series of experiments on the intelligence of the English Sparrow and Cowbird have been obtained. The rate of learning is slower than that found earlier, but my present conditions were different inasmuch as the primary object here was to get results on imitation. This should be kept in mind by the reader in connection with all the tests here described. The Cowbirds spent much of their time in looking for parasites on the Sparrows and parts of the cage.

2. The male English Sparrow showed signs of imitating the female Sparrow, and more unmistakable signs of imitating the Cowbird. His latest change in behavior satisfied the requirements of the criterion which the writer from previous

results has been led to adopt. For a statement of this criterion see page 8. We not only obtain a more rigid standard, but we are more certain that Bird No. 1 really sees, is interested in, and attends to what the other is doing. It has had such experience with the apparatus, that it is more likely to be interested in what is done in order to open the box.

3. If the Cowbirds did start a series, as they often did, the English Sparrows after a few tests displaced them.

4. This may be accounted for by the fact that the English Sparrow is far more active and though much smaller, often drove the Cowbirds away and held them at bay even after a bitter struggle.

5. The Junco learned to open the food-box, but not until after the female English Sparrow had taken the lead. There was keen rivalry and fighting between them. There was probable imitation of each by the other of the intelligent sort.

6. The White-throated Sparrow and Field Sparrow learned to open the food-box though not so rapidly as some of the other birds. This slowness may be due to the indirect method of the former, to the small size of the latter, and to the fact that both were tried in a cage near the entrance to all the cages, and hence were disturbed a good deal.

7. A young Song Sparrow for a few tests showed signs of rather rapid learning. There were a few uncertain signs of imitation of the intelligent sort with the White-throated, Field, and Song Sparrows and the Junco.

8. In a long series of tests on a pair of Bluebirds, White-crowned Sparrows, and two each of Juncos and Tree, Fox, and Song Sparrows, the best fighters were the ones to open the door early in the series. The male Bluebird early began to lead and finally was the only one to do it. Here again there were some uncertain imitative acts on the part of each Bluebird, but chiefly by the female. A memory series for these Bluebirds showed that they had forgotten little in one month. It also revealed some errors on their part which indicated that such memory of the place to alight upon did not mean that they had at any time analyzed the mechanism of the box. Some learning tests on another male Bluebird, who was alone in the cage, showed that he was very slow in starting.

9. A long series of tests with a pair of Blue Jays gave no results on imitation, but did give good evidence of the male's power to learn. But when the strings were changed he did not adapt himself as readily as the English Sparrow. However, it was still possible for the Jay to use his old method. This of course makes it impossible to generalize from these tests.

10. In experiments on three Cowbirds,—two males and one female,—two young English Sparrows and a male Balti-

more Oriole, one of the male Cowbirds first opened the door but the Oriole soon displaced him and learned to do it in his own way. Later a more pugnacious Oriole was placed in the cage. He soon was the one who opened the door. There were signs of imitation here, although he did not use the method Oriole No. 1 used. Later Oriole No. 1 imitated Oriole No. 2.

11. When the strings were changed these birds did not show as ready adaptation as the English Sparrow. This may be due to the fact that it was still possible for Oriole No. 1 to use his old method which he did.

12. The old crow was so cautious that beginning tests with him were long, and there were many efforts. He learned rapidly when once started. He adapted himself to the first change in the position of the strings on the box with less readiness than the female English Sparrow. With the second and third change his results were quite comparable with the female English Sparrow's. For the fourth change the Young Crow 1 interfered. The crows, largely because the Young Crow 1 in his incessant play with the box aided materially in bringing about favorable conditions, furnish us with the best examples of imitation. This is so from the fact that the old crow was led through imitation to change his method of opening the door. The more rigid and difficult criterion is thus shown to be practicable here as well as with the Orioles, the Junco and English Sparrow and Cowbird.

13. In those series where it was possible to obtain data it is somewhat evident that birds of the same species imitated each other more readily than the members of a different species. Yet the latter has occurred twice at least.

14. In the case of nearly every bird which really learned to open the door, we have found repeated pulling of the strings with the door already open. This with the behavior of the birds when the strings were changed to a new position and opening the door in the old place, if such was possible, point to the fact that there was not much analysis of the relations of the situation or parts of the box.

15. In view of what has just been said, it would seem advisable to suggest Intelligent Imitation as a new class leaving the words "reflective," "voluntary," or "intentional," for that which is probably to be classed as distinctively human.

Some of the results of the present paper were presented before the Section on Animal Behavior at the meeting of the International Congress of Zoölogy which met in Boston, 1907. All of the results of this paper together with others were made the basis of a report at the Chicago meeting of the American Psychological Association (1907-08). In a somewhat modified form this same study was awarded the Walker Prize of the Boston Society of Natural History in 1908.

THE ŒDIPUS-COMPLEX AS AN EXPLANATION OF HAMLET'S MYSTERY: A STUDY IN MOTIVE

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English-speaking psychologists have as yet paid relatively little attention to the study of genius and of artistic creativeness, at least so far as the method of analysing in detail the life-history of individual men of genius is concerned. In Germany, stimulated by Moebius' example, many workers have obtained valuable results by following this biographical line of investigation. Within the past few years this study has been infused with fresh interest by the luminous writings of Professor Freud, who has laid bare some of the fundamental mechanisms by which artistic and poetic creativeness proceeds.[1] He has shewn that the main characteristics of these mechanisms are common to many apparently dissimilar mental processes, such as dreams, wit, psycho-neurotic symptoms, etc.[2] and further that all these processes bear an intimate relation to fantasy, to the realisation of non-conscious wishes, to psychological "repression" (*Verdrängung*), to the re-awakening of childhood memories, and to the psycho-sexual life of the subject. His analysis of Jensen's novel Gradiva will serve as a model to all future studies of the kind.

It is generally recognised that although great writers and poets have frequently made the most penetrating generalisations in practical psychology, the world has always been slow to profit by their discoveries. Of the various reasons for this fact one may here be mentioned, for it is cognate to the present argument. It is that the artist is often not distinctly aware of the real meaning of what he is seeking to express, and is never aware of its source. The difficulty experienced by the artist in arriving at the precise meaning of the creation to which he is labouring to give birth has been brilliantly demonstrated by Bernard Shaw[3] in the case of Ibsen and Wagner. The artist

[1] Freud: Der Wahn und die Träume in W. Jensen's Gradiva, 1907. Der Dichter und das Phantasieren. Neue Revue, 1908. No. 10, S. 716.

[2] Freud: Traumdeutung, 1900. Der Witz und seine Beziehung zum Unbewussten, 1905. Drei Abhandlungen zur Sexualtheorie, 1905. Sammlung kleiner Schriften zur Neurosenlehre, 1906. Zweite Folge, etc.

[3] Bernard Shaw: The Quintessence of Ibsenism, 1891. The Perfect Wagnerite. 2nd ed., 1901.

works under the impulsion of an apparently external force; indeed, being unaware of the origin of his inspiration, it frequently happens that he ascribes it to an actual external agency, divine or otherwise. We now know that this origin is to be found in mental processes which have been forgotten by the subject, but which are still operative; in Freud's language, the creative output is a sublimated manifestation of various thwarted and "repressed" wishes, of which the subject is no longer conscious. The artist, therefore, gives expression to the creative impulse in a form which satisfies his internal need, but in terms which he cannot translate into easily comprehensible language; he must express it directly as it feels to him, and without taking into consideration his possible audience. An evident corollary of this is that the farther away the artist's meaning from the minds of those not in possession of any of his inspiration the more difficult and open to doubt is the interpretation of it; hence the flood of quite silly criticism that follows in the wake of such men as Schopenhauer and Nietzche.

It is to be expected that the knowledge so laboriously gained by the psycho-analytic method of investigation would prove of great value in the attempt to solve the psychological problems concerned with the obscurer motives of human action and desire. In fact one can see no other scientific mode of approach to such problems than through the patient unravelling of the deeper and hidden layers of the mind by means of the dissecting procedures employed in this method. The stimulating results already obtained by Muthmann,[1] Rank,[2] Riklin,[3] Sadger,[4] Abraham[5] and others are only a foretoken of the applications that will be possible when this method has been employed over a larger field than has hitherto been the case.

The particular problem of Hamlet, with which this paper is concerned, is intimately related to some of the most frequently recurring problems that are presented in the course of psychoanalysis, and it has thus seemed possible to secure a new point of view from which an answer might be offered to questions that have baffled attempts made along less technical routes. Some of the most competent literary authorities have freely acknowledged the inadequacy of all the solutions of the prob-

[1] Muthmann: Psychiatrisch-Theologische Grenzfragen. Zeitschr. f. Religions-psychologie. Bd. I. Ht. 2 u. 3.

[2] Otto Rank: Der Künstler. Ansätze zu einer Sexual-psychologie, 1907. Der Mythus von der Geburt des Helden, 1909.

[3] Riklin: Wunscherfüllung und Symbolik im Märchen, 1908.

[4] Sadger: Konrad Ferdinand Meyer. Eine pathographisch-psychologische Studie, 1908. Aus dem Liebesleben Nicolaus Lenaus, 1909.

[5] Abraham: Traum und Mythus. Eine Studie zur Völkerpsychologie, 1909.

lem that have up to the present been offered, and from a psychological point of view this inadequacy is still more evident. The aim of the present paper is to expound an hypothesis which Freud some nine years ago suggested in one of the footnotes to his *Traumdeutung;*[1] so far as I am aware it has not been critically discussed since its publication. Before attempting this it will be necessary to make a few general remarks about the nature of the problem and the previous solutions that have been offered.

The problem presented by the tragedy of Hamlet is one of peculiar interest in at least two respects. In the first place the play is almost universally considered to be the chief masterpiece of one of the greatest minds the world has known. It probably expresses the core of Shakspere's philosophy and outlook on life as no other work of his does, and so far excels all his other writings that many competent critics would place it on an entirely separate level from them. It may be expected, therefore, that anything which will give us the key to the inner meaning of the play will necessarily give us the clue to much of the deeper workings of Shakspere's mind. In the second place the intrinsic interest of the play is exceedingly great. The central mystery in it, namely the cause of Hamlet's hesitancy in seeking to obtain revenge for the murder of his father, has well been called the Sphinx of modern Literature.[2] It has given rise to a regiment of hypotheses, and to a large library of critical and controversial literature; this is mainly German and for the most part has grown up in the past fifty years. No review of the literature will here be attempted, for this is obtainable in the writings of Loening,[3] Döring,[4] and others, but the main points of view that have been adopted must be briefly mentioned.

Of the solutions that have been offered many will probably live on account of their very extravagance.[5] Allied if not belonging to this group are the hypotheses that see in Hamlet allegorical tendencies of various kinds. Thus Gerth[6] sees in

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[1] S. 183.

[2] It is but fitting that Freud should have solved the riddle of this Sphinx, as he has that of the Theban one.

[3] Loening: Die Hamlet-Tragödie Shakespeares, 1893. This book is warmly to be recommended, for it is by far the most critical work on the subject.

[4] Döring: Ein Jahrhundert deutscher Hamlet-Kritik. Die Kritik, 1897, Nr. 131.

[5] Such, for instance, is the view developed by Vining (The Mystery of Hamlet, 1881) that Hamlet's weakness is to be explained by the fact that he was a woman wrongly brought up as a man.

[6] Gerth: Der Hamlet von Shakespeare, 1861.

the play an elaborate defence of Protestantism, Rio[1] and Spanier[2] on the contrary a defence of Roman Catholicism. Stedefeld[3] regards it as a protest against the scepticism of Montaigne, Feis[4] as one against his mysticism and bigotry. A writer under the name of Mercade[5] maintains that the play is an allegorical philosophy of history; Hamlet is the spirit of truth-seeking which realises itself historically as progress, Claudius is the type of evil and error, Ophelia is the Church, Polonius its Absolutism and Tradition, the Ghost is the ideal voice of Christianity, Fortinbras is Liberty, and so on. Many writers, including Plumptre[6] and Silberschlag,[7] have read the play as a satire on Mary, Queen of Scots, and her marriage with Bothwell after the murder of Darnley, while Elze,[8] Isaac,[9] and others have found in it a relation to the Earl of Essex's domestic history. Such hypotheses overlook the great characteristic of all Shakspere's works, namely the absence in them of any conscious tendencies; allegorical or otherwise. In his capacity to describe human conduct directly as he observed it, and without any reference to the past or future evolution of motive, lay at the same time his strength and his weakness. In a more conscious age than his or ours Shakspere's works would necessarily lose much of their interest.

The most important hypotheses that have been put forward are sub-varieties of three main points of view. The first of these sees the difficulty in the performance of the task in Hamlet's temperament, which is not suited to effective action of any kind; the second sees it in the nature of the task, which is such as to be almost impossible of performance by any one; and the third in some special feature in the nature of the task which renders it peculiarly difficult or repugnant to Hamlet.

The *first* of these views, which would trace the inhibition

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[1] Rio: Shakespeare, 1864.

[2] Spanier: Der "Papist" Shakespeare im Hamlet, 1890.

[3] Stedefeld: Hamlet, ein Tendenzdrama Sheakespeare's gegen die skeptische und kosmopolitische Weltanschauung des M. de Montaigne, 1871.

[4] Feis: Shakspere and Montaigne, 1884. The importance of Montaigne's influence on Shakspere, as shewn in Hamlet, was first remarked by Sterling (London and Westminster Review, 1838, p. 321), and has been clearly pointed out by J. M. Robertson in his book, Montaigne and Shakspere, 1897.

[5] Mercade: Hamlet; or Shakespeare's Philosophy of History, 1875.

[6] Plumptre: Observations on Hamlet, being an attempt to prove that Shakespeare designed his tragedie as an indirect censure on Mary, Queen of Scots, 1796.

[7] Silberschlag: Shakespeare's Hamlet. Morgenblatt, 1860, Nr. 46, 47.

[8] Elze: Shakespeare's Jahrbuch, Bd. III.

[9] Isaac: Shakespeare's Jahrbuch, Bd. XVI.

to some defect in Hamlet's constitution, was independently elaborated more than a century ago by Goethe,[1] Schlegel[2] and Coleridge.[3] Owing mainly to Goethe's advocacy it has been the most widely-held view of Hamlet, though in different hands it has undergone innumerable modifications. Goethe promulgated the view as a young man and when under the influence of Herder,[4] who later abandoned it.[5] It essentially maintains that Hamlet, for temperamental reasons, was fundamentally incapable of decisive action of any kind. These temperamental reasons are variously described by different writers, by Coleridge as "overbalance in the contemplative faculty," by Schlegel as "reflective deliberation—often a pretext to cover cowardice and lack of decision," by Vischer[6] as "melancholic disposition," and so on. A view fairly representative of the pure Goethe school would run as follows: Owing to his highly developed intellectual powers, and his broad and many-sided sympathies, Hamlet could never take a simple view of any question, but always saw a number of different aspects and possible explanations of every problem. A given course of action never seemed to him unequivocal and obvious, so that in practical life his scepticism and reflective powers paralysed his conduct. He thus stands for what may roughly be called the type of an intellect over-developed at the expense of the will, and in Germany he has frequently been held up as a warning example to university professors who shew signs of losing themselves in abstract trains of thought at the expense of contact with reality.[7]

There are at least three grave objections to this view of Hamlet's hesitancy, one based on general psychological considerations and the others on objective evidence furnished by the play. It is true that at first sight increasing scepticism and reflexion apparently tend to weaken motive, in that they tear aside common illusions as to the value of certain lines of

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[1] Goethe: Wilhelm Meister's Lehrjahre, 1795.
[2] Schlegel: Vorlesungen über dramatische Kunst und Litteratur, III, 1809.
[3] Coleridge: Lectures on Shakespeare, 1808.
[4] Herder: Von deutscher Art und Kunst, 1773.
[5] Herder: Aufsatz über Shakespeare im dritten Stück der Adrastea, 1801.
[6] Vischer: Kritische Gänge. N. F., Ht. 2, 1861.
[7] See for instance Köstlin: Shakespeare und Hamlet. Morgenblatt, 1864, Nr. 25, 26. Already in 1816 Börne in his Dramaturgischen Blättern had cleverly developed this idea. He closes one article with the words "Hätte ein Deutscher den Hamlet gemacht, so würde ich mich gar nicht darüber wundern. Ein Deutscher braucht nur eine schöne, leserliche Hand dazu. Er schreibt sich ab und Hamlet ist fertig."

conduct. This is well seen, for instance, in a matter such as social reform, where a man's energy in carrying out minor philanthropic undertakings wanes in proportion to the amount of clear thought he devotes to the subject. But closer consideration will shew that this debilitation is a qualitative rather than a quantitative one. Scepticism leads to a simplification of motive in general, and to a reduction in the number of those motives that are efficacious; it brings about a lack of adherence to certain conventional ones rather than a general failure in the springs of action. Every student of clinical psychology knows that any such general weakening in energy is invariably due to another cause than intellectual scepticism, namely, to the functioning of abnormal unconscious complexes. This train of thought need not here be further developed, for it is really irrelevant to discuss the cause of Hamlet's general aboulia if, as will presently be maintained, this did not exist; the argument, then, must remain unconvincing except to those who already accept it. Attempts to attribute Hamlet's general aboulia to less constitutional causes, such as to grief due to the death of his father and adultery of his mother,[1] are similarly inefficacious, for psycho-pathology has clearly demonstrated that such grief is in itself quite inadequate as an explanation of this condition.

Unequivocal evidence of the inadequacy of the hypothesis under discussion may further be obtained from perusal of the play. In the first place there is every reason to believe that, apart from the task in question, Hamlet is a man capable of very decisive action. This could be not only impulsive, as in the killing of Polonius, but deliberate, as in the arranging for the death of Guildenstern and Rosencrantz. His biting scorn and mockery towards his enemies, and even towards Ophelia, his cutting denunciation of his mother, his lack of remorse after the death of Polonius, are not signs of a gentle, yielding or weak nature. His mind was as rapidly made up about the organisation of the drama to be acted before his uncle, as it was resolutely made up when the unpleasant task had to be performed of breaking with the uncongenial Ophelia. He shews no trace of hesitation when he stabs the listener behind the curtain,[2] when he makes his violent onslaught on the pirates, leaps into the grave with Laertes or accepts his challenge to the fencing match, or when he follows his father's ghost on to the battlements; nor is there any lack of determination in his resolution to meet the ghost;

[1] A suggestion first proffered by Herder. *Op. cit.*, 1801.

[2] I find Loening's argument quite conclusive that Hamlet did not have the king in his mind when he committed this deed. (*Op. cit.*, S., 242-244, 362-363.)

> "I 'll speak to it, though hell itself should gape
> And bid me hold my peace,"

or in his cry when Horatio clings to him,

> "Unhand me, gentlemen;
> By heaven, I 'll make a ghost of him that lets me;
> I say, away!"

On none of these occasions do we find any sign of that paralysis of doubt which has so frequently been imputed to him. On the contrary, not once is there any sort of failure in moral or physical courage except only in the matter of the revenge. In the second place, as will later be expounded, Hamlet's attitude is never that of a man who feels himself not equal to the task, but rather that of a man who for some reason cannot bring himself to perform his plain duty. The whole picture is not, as Goethe depicted, that of a gentle soul crushed beneath a colossal task, but that of a strong man tortured by some mysterious inhibition.

Already in 1827 a protest was raised by Hermes[1] against Goethe's interpretation, and since then a number of hypotheses have been put forward in which Hamlet's temperamental deficiencies are made to play a very subordinate part. The *second* view here discussed goes in fact to the opposite extreme, and finds in the difficulty of the task itself the sole reason for the non-performance of it. This view was first hinted by Fletcher,[2] and was independently developed by Klein[3] and Werder.[4] It maintains that the extrinsic difficulties inherent in the task were so stupendous as to have deterred any one, however determined. To do this it is necessary to conceive the task in a different light from that in which it usually is conceived. As a development largely of the Hegelian teachings on the subject of abstract justice, Klein, and to a lesser extent Werder, contended that the essence of Hamlet's revenge consisted not merely in slaying the murderer, but of convicting him of his crime in the eyes of the nation. The argument, then, runs as follows: The nature of Claudius' crime was so frightful and so unnatural as to render it incredible unless supported by a very considerable body of evidence. If Hamlet had simply slain his uncle, and then proclaimed, without a shred of supporting evidence, that he had done it to avenge a fratricide, the nation would infallibly have cried out upon him, not only

[1] Hermes: Ueber Shakespeare's Hamlet und seine Beurteiler, 1827.
[2] Fletcher: Westminster Review, Sept., 1845.
[3] Klein: Emil Devrient's Hamlet. Berliner Modenspiegel, eine Zeitschrift für die elegante Welt, 1846, Nr. 23, 24.
[4] Werder: Vorlesungen über Shakespeare's Hamlet, 1875. Translated by E. Wilder, 1907, under the title of "The Heart of Hamlet's Mystery."

for murdering his uncle to seize the throne himself, but also for selfishly seeking to cast an infamous slur on the memory of a man who could no longer defend his honour. This would have resulted in the sanctification of the uncle, and so the frustration of the revenge. In other words it was the difficulty not so much of the act itself that deterred Hamlet as of the situation that would necessarily result from the act.

Thanks mainly to Werder's ingenious presentation of this view, several prominent critics, including Rolfe,[1] Corson,[2] Furness,[3] Hudson[4] and Halliwell-Phillips[5] have given it their adherence. It has not found much favour in the Hamlet-literature itself, and has been crushingly refuted by a number of able critics, particularly by Tolman,[6] Loening,[7] Hebler,[8] Ribbeck,[9] Bradley,[10] Baumgart,[11] and Bulthaupt.[12] I need, therefore, do no more than mention one or two of the objections that can be raised to it. It will be seen that to support this hypothesis the task has in two respects been made to appear more difficult than is really the case; first it is assumed to be not a simple revenge in the ordinary sense of the word, but a complicated bringing to judgement in a more or less legal way; and secondly the importance of the external obstacles have been exaggerated. This distortion of the meaning of the revenge is purely gratuitous and has no warrant in any passage of the play, or elsewhere where the word is used in Shakspere.[13] Hamlet never doubted that he was the legitimately appointed instrument of punishment, and when at the end of the play he secures his revenge, the dramatic situation is correctly resolved, although the nation is not even informed, let alone convinced, of the murder that is being avenged. To secure evidence that would convict the uncle in a court of law was from the nature of the case impossible, and no tragical situation can arise from an attempt to achieve the impossible, nor can the interest of

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[1] Rolfe: Introduction to the English Translation of Werder, 1907.
[2] Corson: Cited by Rolfe. *Loc. cit.*
[3] Furness: A New Var. Ed. of Shakespeare, Vol. III and IV, 1877.
[4] Hudson: Shakespeare's Life, Art, and Characters, 2nd ed., 1882.
[5] Halliwell-Phillips: Memoranda on the tragedy of Hamlet, 1879.
[6] Tolman: Views abont Hamlet and Other Essays, 1904.
[7] Loening: *Op. cit.*, S. 110-113 and 220-224.
[8] Hebler: Aufsätze über Shakespeare, 2e Ausg., 1874, S. 258-278.
[9] Ribbeck: Hamlet und seine Ausleger, 1891, S. 567.
[10] Bradley: Shakespearian Tragedy, 1904, Art. Hamlet.
[11] Baumgart: Die Hamlet-Tragödie und ihre Kritik, 1877, S. 7-29.
[12] Bulthaupt: Dramaturgie des Schauspiels, 4e Aufl., 1891, II, S. 237.
[13] Loening: (*Op. cit.*, Cap. VI), has made a detailed study of the significance of revenge in Shakspere's period and as illustrated throughout his works; his conclusion on the point admits of no questioning.

the spectator be aroused for an obviously one-sided struggle. The external situation is similarly distorted for the needs of this hypothesis. On which side the people would have been in any conflict is clearly enough perceived by Claudius, who dare not even punish Hamlet for killing Polonius. (Act IV, Sc. 3.)

> "Yet must not we put the strong law on him;
> He 's loved of the distracted multitude,
> Who like not in their judgment, but in their eyes;"

and again in Act IV, Sc. 7,

> "The other motive,
> Why to a public count I might not go,
> Is the great love the general gender bear him;
> Who, dipping all his faults in their affection,
> Would, like the spring that turneth wood to stone,
> Convert his gyves to graces; so that my arrows,
> Too slightly timber'd for so loud a wind,
> Would have reverted to my bow again,
> And not where I had aim'd them."

The ease with which the people could be roused against Claudius is well demonstrated after Polonius' death, when Laertes carried them with him in an irresistible demand for vengeance, which would promptly have been consummated had not the king convinced the avenger that he was innocent. Here the people, the "false Danish dogs" whose loyalty to Claudius was so feather-light that they gladly hailed as king even Laertes, a man who had no sort of claim on the throne, were ready enough to believe in the murderous guilt of their monarch without any shred of supporting evidence, when the accusation was not even true, and where no motive for murder could be discerned at all approaching in weight the two powerful ones that had actually led him to kill his brother. Where Laertes succeeded, it is not likely that Hamlet, the darling of the people, would have failed. Can we not imagine the march of events during the play before the court had Laertes been at the head instead of Hamlet; the straining observation of the fore-warned nobles, the starting-up of the guilty monarch who can bear the spectacle no longer, the open murmuring of the audience, the resistless impeachment by the avenger, and the instant execution effected by him and his devoted friends? Indeed, the whole Laertes episode seems almost to have been purposely woven into the drama so as to shew the world how a pious son should really deal with his father's murderer, how possible was the vengeance under these particular circumstances, and by contrast to illuminate the ignoble vacillation of Hamlet whose honour had been doubly wounded by the same treacherous villain.

Most convincing proof of all that the tragedy cannot be

interpreted as residing in difficulties produced by the external situation is Hamlet's own attitude toward his task. He never behaves as a man confronted with a straight-forward task, in which there are merely external difficulties to overcome. If this had been the case surely he would from the first have confided in Horatio and his other friends who so implicitly believed in him, and would deliberately have set to work with them to formulate plans by means of which these obstacles might be overcome. Instead of this he never makes any serious attempt to deal with the external situation, and indeed throughout the play makes no concrete reference to it as such, even in the significant prayer scene when he had every opportunity for disclosing the reasons for his non-action. There is therefore no escape from the conclusion that so far as the external situation is concerned the task was a possible one.

If Hamlet is a man capable of action, and the task is one capable of achievement, what then can be the reason that he does not execute it? Critics who have realised the inadequacy of the above-mentioned hypotheses have been hard pressed to answer this question. Some, struck by Klein's suggestion that the task is not really what it is generally supposed to be, have offered novel interpretations of it. Thus Mauerhof[1] maintains that the Ghost's command to Hamlet was not to kill the king but to put an end to the life of depravity his mother was still leading, and that Hamlet's problem was how to do this without tarnishing her fair name. Dietrich[2] put forward the singular view that Hamlet's task was to restore to Fortinbras the lands that had been unjustly filched from the latter's father. When straits such as these are reached it is no wonder that many competent critics have taken refuge in the conclusion that the tragedy is in its essence inexplicable, incongruous and incoherent. This view, first sustained in 1846 by Rapp,[3] has been developed by a number of writers, including Rümelin[4], Benedix[5], Von Friefen[6], and many others. The causes of the dramatic imperfection of the play have been variously stated, by Dowden[7] as a conscious interpolation by Shakspere of some secret, by Reichel[8] as the defacement by an

[1] Mauerhof: Ueber Hamlet, 1882.
[2] Dietrich: Hamlet, der Konstabel der Vorsehung; eine Shakespeare-Studie, 1883.
[3] Rapp: Shakespeare's Schauspiele übersetzt und erläutert. Bd. VIII, 1846.
[4] Rümelin: Shakespeare-Studien, 1866.
[5] Benedix: Die Shakespearomanie, 1873.
[6] Von Friefen: Briefe über Shakespeare's Hamlet, 1864.
[7] Dowden: Shakespeare; his development in his works, 1875.
[8] Reichel: Shakespeare-Litteratur, 1887.

uneducated actor called Shakspere of a play by an unknown poet called Shakespeare, etc. Many upholders of this conclusion have consoled themselves that in this very obscurity, so characteristic of life in general, lies the power and attractiveness of the play. Even Grillparzer[1] saw in its impenetrability the reason for its colossal effectiveness; he adds "Dadurch wird es zu einem getreuen Bild der Weltbegebenheiten und wirkt ebenso ungeheuer als diese." Now, vagueness and obfuscation may or may not be characteristic of life in general, but they are certainly not the attributes of a successful drama. No disconnected and meaningless drama could have produced the effects on its audiences that Hamlet has continuously done for the past three centuries. The underlying meaning of the drama may be totally obscure, but that there is one, and one which touches on problems of vital interest to the human heart, is empirically demonstrated by the uniform success with which the drama appeals to the most diverse audiences. To hold the contrary is to deny all the canons of dramatic art accepted since the time of Aristotle. Hamlet as a masterpiece stands or falls by these canons.

We are compelled then to take the position that there is some cause for Hamlet's vacillation which has not yet been fathomed. If this lies neither in his incapacity for action in general, nor in the inordinate difficulty of the task in question, then it must of necessity lie in the *third* possibility, namely in some special feature of the task that renders it repugnant to him. This conclusion, that Hamlet at heart does not want to carry out the task, seems so obvious that it is hard to see how any critical reader of the play could avoid making it.[2] Some of the direct evidence for it furnished in the play will presently be brought forward when we discuss the problem of the cause for his repugnance, but it will first be necessary to mention some of the views that have been expressed on this subject. The first writer clearly to recognise that Hamlet was a man not baffled in his endeavours but struggling in an internal conflict was Ulrici[3] in 1839. The details of Ulrici's hypothesis, which like Klein's, originated in the Hegelian views of morality, are hard to follow, but the essence of it is the contention that Hamlet gravely doubted the moral legitimacy of revenge. He was thus plunged in a struggle between his natural tendency to avenge his father and his highly developed ethical

[1] Grillparzer: Studien zur Litterargeschichte, 3e Ausg., 1880.

[2] Anyone who doubts this conclusion is recommended to read Loening's convincing chapter (XII), "Hamlet's Verhalten gegen seiner Aufgabe."

[3] Ulrici: Shakespeare's dramatische Kunst; Geschichte und Characteristik des Shakespeare'schen Dramas, 1839.

and Christian views, which forbade the indulging of this instinctive desire. This hypothesis has been much developed of late years, most extensively by Liebau,[1] Mézières,[2] Gerth,[3] Baumgart,[4] and Robertson,[5] on moral, ethical and religious lines. Kohler[6] ingeniously transferred the conflict to the sphere of jurisprudence, maintaining that Hamlet was in advance of his time in recognising the superiority of legal punishment to private revenge, and was thus a fighter in the van of progress. This special pleading has been effectually refuted by Loening[7] and Fuld,[8] and is contradicted by all historical considerations. Finally Schipper[9] and, more recently, Gelber[10] have suggested that the conflict was a purely intellectual one, in that Hamlet was unable to satisfy himself of the adequacy or reliability of the Ghost's evidence.

The obvious question that one puts to the upholders of any of the above hypotheses is: why did Hamlet in his monologues give us no indication of the nature of the conflict in his mind? As we shall presently see, he gave several excuses for his hesitancy, but never once did he hint at any doubt about what his duty was in the matter. He was always clear enough about what he *ought* to do; the conflict in his mind ranged about the question why he could n't bring himself to do it. If Hamlet had at any time been asked whether it was right for him to kill his uncle, or whether he definitely intended to do so, no one can seriously doubt what his instant answer would have been. Throughout the play we see his mind irrevocably made up as to the necessity of a given course of action, which he fully accepts as being his bounden duty; indeed, he would have resented the mere insinuation of doubt on this point as an untrue slur on his filial piety. Ulrici, Baumgart and Kohler try to meet this difficulty by assuming that the ethical objection to personal revenge was never clearly

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[1] Liebau: Studien über William Shakespeares Trauerspiel Hamlet. Date not stated.

[2] Mézières: Shakspeare, ses oeuvres et ses critiques, 1860.

[3] Gerth: *Op. cit.*

[4] Baumgart: *Op. cit.*

[5] Robertson: Montaigne and Shakspere, 1897, p. 129.

[6] Kohler: Shakespeare vor dem Forum der Jurisprudenz, 1883, and Zur Lehre von der Blutrache, 1885. See also Zeitschr. f. vergleichende Rechtswissenschaft, Bd. V, S. 330.

[7] Loening: Zeitschrift für die gesamte Strafrechtswissenschaft, Bd. V, S. 191.

[8] Fuld: Shakespeare und die Blutrache. Dramaturgische Blätter und Bühnen-Rundschau, 1888, Nr. 44.

[9] Schipper: Shakespeare's Hamlet; æsthetische Erläuterung des Hamlet, etc., 1862.

[10] Gelber: Shakespeare' sche Probleme, Plan und Einheit im Hamlet. 1891.

present to Hamlet's mind; it was a deep and undeveloped feeling that had not fully dawned. I would agree that in no other way can the difficulty be logically met, and further, that in the recognition of Hamlet's non-consciousness of the cause of the repugnance to his task we are nearing the core of the mystery. But an invincible difficulty in the way of accepting any of the causes of repugnance suggested above is that the nature of them is such that a keen and introspective thinker, as Hamlet was, would infallibly have recognised them, and would have openly debated them instead of deceiving himself with a number of false pretexts in the way we shall presently mention. Loening[1] well states this in the sentence: "Handelt es sich um einen Konflikt zwischen der von aussen gebotenen Racheplicht und einer inneren *sittlichen* oder *rechtlichen* Gegenströmung, so *muss* dieser Zwiespalt und seine Ursache bei einem so denkkräftigen und ans Denken gewohnten Menschen wie Hamlet zur Reflexion gebracht werden."

In spite of this difficulty the hint of an approaching solution encourages us to pursue more closely the argument at that point. The hypothesis stated above may be correct up to a certain stage and then have failed for lack of special knowledge to guide it further. Thus Hamlet's hesitancy may have been due to an internal conflict between the need to fulfil his task on the one hand, and some special cause of repugnance to it on the other; further, the explanation of his not disclosing this cause of repugnance may be that he was not conscious of its nature; and yet the cause may be one that doesn't happen to have been considered by any of the upholders of the hypothesis. In other words the first two stages in the argument may be correct, but not the third. This is the view that will now be developed, but before dealing with the third stage in the argument it is first necessary to establish the probability of the first two, namely that Hamlet's hesitancy was due to some special cause of repugnance for his task, and that he was unaware of the nature of this repugnance.

A preliminary obstruction to this line of thought, based on some common prejudices on the subject of mental dynamics, may first be considered. If Hamlet was not aware of the cause of his inhibition, doubt may be felt as to the possibility of our penetrating to it. This pessimistic thought was thus expressed by Baumgart:[2] "Das was ihn—Hamlet—an der Rache hindert, ist ihm selbst ein Problem und *deshalb* musste es für uns alle ein Problem bleiben." Fortunately for our investigation, however, psycho-analytic study has proved beyond doubt that

[1] Loening: Die Hamlet-Tragödie Shakespeares, 1893, S. 78.
[2] Baumgart: *Op. cit.* S. 48.

mental trends hidden from the subject himself may come to external expression in a way that reveals their nature to a trained observer, so that the possibility of success is not to be thus excluded. Loening[1] has further objected that the poet himself has not revealed this hidden mental trend, or even given any indication of it. The first part of this objection is certainly true, otherwise there would be no problem to discuss, but we shall presently see that the second is by no means true. It may be asked: why has the poet not put in a clearer light the mental trend we are trying to discover? Strange as it may appear, the answer is the same as in the case of Hamlet himself, namely, he could not, because he was unaware of its nature. We shall later deal with this matter in connection with the relation of the poet to the play. But, if the motive of the play is so obscure, to what can we attribute its powerful effect on the audience, for, as Kohler[2] asks, "Wer, der je Hamlet gesehen, hat nicht den furchtbaren Konflikt empfunden, welcher die Seele des Helden bewegt?" This can only be because the hero's conflict finds its echo in a similar inner conflict in the mind of the hearer, and the more intense is this already present conflict the greater is the effect of the drama.[3] Again, the hearer himself does not know the inner cause of the conflict in his mind, but experiences only the outer manifestations of it. We thus reach the apparent paradox that the hero, the poet, and the audience are all profoundly moved by feelings due to a conflict of the source of which they are unaware.

The fact, however, that such a conclusion should seem paradoxical is in itself a censure on popular views of the actual workings of the human mind, and, before undertaking to sustain the assertions made in the preceding paragraph, it will first be necessary to make a few observations on prevailing views of motive and conduct in general. The new science of clinical psychology stands nowhere in sharper contrast to the older attitudes towards mental functioning than on this very matter. Whereas the generally accepted view of man's mind, usually implicit and frequently explicit in psychological writings, regards it as an interplay of various processes that are for the most part known to the subject, or are at all events accessible to careful introspection on his part, the analytic methods of clinical psychology have on the contrary decisively

[1] Loening: *Op. cit.*, S. 78, 79.

[2] Kohler: Shakespeare vor dem Forum des Jurisprudenz, 1883, S. 195.

[3] It need hardly be said that the play appeals to its audience in a number of different respects. We are here considering only the main appeal, the central conflict in the tragedy.

proved that a far greater number of these processes than is commonly surmised arise from origins that he never suspects. Man's belief that he is a self-conscious animal, alive to the desires that impel or inhibit his actions, and aware of all the springs of his conduct, is the last stronghold of that anthropomorphic outlook on life which so long has dominated his philosophy, his theology and, above all, his psychology. In other words, the tendency to take man at his own valuation is rarely resisted, and we assume that the surest way of finding out why a person does a given thing is simply to ask him, relying on the knowledge that he, like ourselves in a like circumstance, will feel certain of the answer and will infallibly provide a plausible reason for his conduct. Special objective methods of penetrating into obscure mental processes, however, disclose the most formidable obstacles in the way of this direct introspective route, and reveal powers of self-deception in the human mind to which a limit has yet to be found. If I may be allowed to quote from a former paper:[1] "We are beginning to see man not as the smooth, self-acting agent he pretends to be, but as he really is, a creature only dimly conscious of the various influences that mould his thought and action, and blindly resisting with all the means at his command the forces that are making for a higher and fuller consciousness."

That Hamlet is suffering from an internal conflict, the essential nature of which is inaccessible to his introspection, is evidenced by the following considerations. Throughout the play we have the clearest picture of a man who sees his duty plain before him, but who shirks it at every opportunity, and suffers in consequence the most intense remorse. To paraphrase Sir James Paget's famous description of hysterical paralysis: Hamlet's advocates say he cannot do his duty, his detractors say he will not, whereas the truth is that he cannot will. Further than this, the defective will-power is localised to the one question of killing his uncle; it is what may be termed a *specific aboulia*. Now instances of such specific aboulias in real life invariably prove, when analysed, to be due to an unconscious repulsion against the act that cannot be performed. In other words, whenever a person cannot bring himself to do something that every conscious consideration tells him he should do, it is always because for some reason he doesn't want to do it; this reason he will not own to himself and is only dimly if at all aware of. That is exactly the case with Hamlet. Time and again he works himself up,

[1] Rationalisation in Every Day Life. Journal of Abnormal Psychology, Aug.—Sept., 1908, Vol. III, p. 168.

points out to himself his obvious duty, with the cruellest self-reproaches lashes himself to agonies of remorse, and once more falls away into inaction. He eagerly seizes every excuse for occupying himself with any question rather than the performance of his duty, just as on a lesser plane a schoolboy faced with a distasteful task whittles away his time in arranging his books, sharpening his pencils, and fidgetting with any little occupation that will serve as a pretext for putting off the task.

Highly significant is the fact that the grounds Hamlet gives for his hesitancy are grounds none of which will stand a moment's serious consideration, and which continually change from one time to another. One moment he pretends he is too cowardly to perform the deed or that his reason is paralysed by "bestial oblivion," at another he questions the truthfulness of the ghost, in another, when the opportunity presents itself in its naked form, he thinks the time is unsuited,—it would be better to wait till the king was in some evil act and then to kill him, and so on. When a man gives at different times a different reason for his conduct it is safe to infer that, whether purposely or not, he is concealing the true reason. Wetz,[1] discussing a similar problem in reference to Iago, penetratingly observed, "nichts ist ein so guter Beweis für die Unechtheit der Motive, die Iago sich einreden will, *als der stete Wechsel dieser Motive.*" We can therefore safely dismiss all the alleged motives that Hamlet propounds, as being more or less successful attempts on his part to blind himself with self-deception. Loening's[2] summing-up of them is not too emphatic, when he says, "alle widersprechen sich, *es sind samt und sonders falsche und Scheingründe.*" The more specious the explanation Hamlet puts forth the more easily does it satisfy him, and the more readily will the reader accept it as the real motive. The alleged motives excellently illustrate the mechanisms of psychological evasion and rationalisation I have elsewhere described.[3] It is not necessary, however, to discuss them individually, for Loening has with the greatest perspicacity done this in detail, and has effectually demonstrated how utterly untenable they all are.[4]

Still, in his moments of self-reproach Hamlet sees clearly through the recalcitrancy of his conduct, and renews his efforts to achieve action. It is interesting to notice how his out-

[1] Wetz: Shakespeare vom Standpunkt der vergleichenden Litteraturgeschichte, 1890, Bd. I, S. 186.
[2] Loening: *Op. cit.*, S. 245.
[3] *Op. cit.*, p. 161.
[4] See especially his analysis of Hamlet's pretext for non-action in the prayer scene. *Op. cit.*, S. 240-242.

bursts of remorse are evoked by external happenings which bring back to his mind that which he would so gladly forget; particularly effective in this respect are incidents that contrast with his own conduct, as when the player is so moved over the fate of Hecuba (Act II, Sc. 2), or when Fortinbras takes the field and "finds quarrel in a straw when honour's at the stake." (Act IV, Sc. 4.) On the former occasion, stung by the "monstrous" way in which the player pours out his feeling at the thought of Hecuba, he arraigns himself in words which surely should effectually dispose of the view that he has any doubt where his duty lies.

> "What's Hecuba to him, or he to Hecuba,
> That he should weep for her? What would he do
> Had he the motive and the cue for passion
> That I have? He would drown the stage with tears,
> And cleave the general ear with horrid speech,
> Make mad the guilty and appal the free,
> Confound the ignorant, and amaze indeed
> The very faculties of eyes and ears.
> Yet I,
> A dull and muddy-mettled rascal, peak,
> Like John-a-dreams, unpregnant of my cause,[1]
> And can say nothing; no, not for a king,
> Upon whose property and most dear life
> A damn'd defeat was made. Am I a coward?
> Who calls me villain? breaks my pate across?
> Plucks off my beard, and blows it in my face?
> Tweaks me by the nose? gives me the lie i' the throat,
> As deep as to the lungs? Who does me this?
> Ha!
> 'Swounds, I should take it; for it cannot be
> But I am pigeon-liver'd, and lack gall
> To make oppression bitter; or ere this
> I should have fatted all the region kites
> With this slave's offal; bloody, bawdy villain!
> Remorseless, treacherous, lecherous, kindless villain!
> O, vengeance!
> Why, what an ass am I! This is most brave,
> That I, the son of a dear father murder'd,
> Prompted to my revenge by heaven and hell,
> Must, like a whore, unpack my heart with words,
> And fall a-cursing, like a very drab,
> A scullion!"

The readiness with which his guilty conscience is stirred into activity is again evidenced on the second appearance of the Ghost when Hamlet cries,

> "Do you not come your tardy son to chide,
> That, lapsed in time and passion, lets go by
> The important acting of your dread command?
> Oh, say!"

The Ghost at once confirms this misgiving by answering,

> "Do not forget: this visitation
> Is but to whet thy almost blunted purpose."

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[1] How the very core of the problem is contained in these four words.

In short, the whole picture presented by Hamlet, his deep depression, the hopeless note in his attitude towards the world and towards the value of life, his dread of death,[1] his repeated reference to bad dreams, his self-accusations, his desperate efforts to get away from the thoughts of his duty, and his vain attempts to find an excuse for his recalcitrancy; all this unequivocally points to a tortured conscience, to some hidden ground for shirking his task, a ground which he dare not or cannot avow to himself. We have, therefore, again to take up the argument at this point, and to seek for some evidence that may serve to bring to the light of day the hidden motive.

The extensive experience of the psycho-analytic researches carried out by Freud and his school during the past twenty years has amply demonstrated that certain kinds of mental processes shew a greater tendency to be "repressed" (*verdrängt*) than others. In other words, it is harder for a person to own to himself the existence in his mind of some mental trends than it is of others. In order to gain a correct perspective it is therefore desirable briefly to enquire into the relative frequency with which various sets of mental processes are "repressed." One might in this connection venture the generalisation that those processes are most likely to be "repressed" by the individual which are most disapproved of by the particular circle of society to whose influence he has chiefly been subjected. Biologically stated, this law would run: "That which is inacceptable to the herd becomes inacceptable to the individual unit," it being understood that the term herd is intended in the sense of the particular circle above defined, which is by no means necessarily the community at large. It is for this reason that moral, social, ethical or religious influences are hardly ever "repressed," for as the individual originally received them from his herd, they can never come into conflict with the dicta of the latter. This merely says that a man cannot be ashamed of that which he respects; the apparent exceptions to this need not here be explained. The contrary is equally true, namely that mental trends "repressed" by the individual are those least acceptable to his herd; they are, therefore, those which are, curiously enough, distinguished as "natural" instincts, as contrasted with secondarily acquired mental trends. Loening[2] seems very discerningly to have grasped this, for, in commenting on a remark of Kohler's to the effect that "Wo uns ein Gefühl zum Handeln oder Unter-

[1] Tieck (Dramaturgische Blätter, II, 1826) saw in Hamlet's cowardly fear of death a chief reason for his hesitancy in executing his vengeance.

[2] *Op. cit.*, S. 245, 246.

lassen drängt, da ist es mit hundert Gründen schwanger, mit Gründen, die so leicht sind wie Seifenblasen, aber uns durch Selbstbetrug als höchst respektable, als zwingende Motive erscheinen, weil sie im Hohlspiegel unseres eigenen Gefühls zur riesigen Grösse hinaufgetäuscht werden," he writes "Nur gilt dies nicht, wie Kohler und andere glauben, wenn uns *sittliche*, von der Vernunft *gebilligte* Gefühle drängen (denn diese gestehen wir uns ein, hier bedarf es keines Vorwands), sondern lediglich bei Gefühlen, die aus unserem *Naturell* aufsteigen und deren Befriedigung *der Vernunft widerstreitet.*" It only remains to add the obvious corollary that, as the herd unquestionably selects from the "natural" instincts the sexual ones on which to lay its heaviest ban, so is it the various psycho-sexual trends that most often are "repressed" by the individual. We have here an explanation of the clinical experience that the more intense and the more obscure is a given case of deep mental conflict the more certainly will it be found, on adequate analysis, to centre about a sexual problem. On the surface, of course, this does not appear so, for, by means of various psychological defensive mechanisms, the depression, doubt, and other manifestations of the conflict are transferred on to more acceptable subjects, such as the problems of immortality, future of the world, salvation of the soul, and so on.

Bearing these considerations in mind, let us return to Hamlet. It should now be evident that the conflict hypotheses above mentioned, which see Hamlet's "natural" instinct for revenge inhibited by an unconscious misgiving of a highly ethical kind, are based on ignorance of what actually happens in real life, for misgivings of this kind are in fact readily accessible to introspection. Hamlet's self-study would speedily have made him conscious of any such ethical misgivings, and although he might subsequently have ignored them, it would almost certainly have been by the aid of a process of rationalisation which would have enabled him to deceive himself into believing that such misgivings were really ill founded; he would in any case have remained conscious of the nature of them. We must therefore invert these hypotheses, and realise that the positive striving for revenge was to him the moral and social one, and that the suppressed negative striving against revenge arose in some hidden source connected with his more personal, "natural" instincts. The former striving has already been considered, and indeed is manifest in every speech in which Hamlet debates the matter; the second is, from its nature, more obscure and has next to be investigated.

This is perhaps most easily done by inquiring more intently into Hamlet's precise attitude towards the object of his vengeance, Claudius, and towards the crimes that have to be

avenged. These are two, Claudius' incest with the Queen, and his murder of his brother. It is of great importance to note the fundamental difference in Hamlet's attitude towards these two crimes. Intellectually of course he abhors both, but there can be no question as to which arouses in him the deeper loathing. Whereas the murder of his father evokes in him indignation, and a plain recognition of his obvious *duty* to avenge it, his mother's guilty conduct awakes in him the intensest horror. Furnivall[1] well remarks, in speaking of the Queen, "Her disgraceful adultery and incest, and treason to his noble father's memory, Hamlet has felt in his inmost soul. Compared to their ingrain die, Claudius' murder of his father—notwithstanding all his protestations—is only a skin-deep stain." Now, in trying to define Hamlet's attitude towards his uncle we have to guard against assuming offhand that this is a simple one of mere execration, for there is a possibility of complexity arising in the following way: The uncle has not merely committed *each* crime, he has committed *both* crimes, a distinction of considerable importance, for the *combination* of crimes allows the admittance of a new factor, produced by the possible inter-relation of the two, which prevents the result from being simply one of summation. In addition it has to be borne in mind that the perpetrator of the crimes is a relative, and an exceedingly near relative. The possible inter-relation of the crimes, and the fact that the author of them is an actual member of the family on which they were perpetrated, gives scope for a confusion in their influence on Hamlet's mind that may be the cause of the very obscurity we are seeking to clarify.

We must first pursue further the effect on Hamlet of his mother's misconduct. Before he even knows that his father has been murdered he is in the deepest depression, and evidently on account of this misconduct. The connection between the two is unmistakable in the monologue in Act I, Sc. 2, in reference to which Furnivall[2] writes, "One must insist on this, that before any revelation of his father's murder is made to Hamlet, before any burden of revenging that murder is laid upon him, he thinks of suicide as a welcome means of escape from this fair world of God's, made abominable to his diseased and weak imagination by his mother's lust, and the dishonour done by her to his father's memory."

> "O! that this too solid flesh would melt,
> Thaw and resolve itself into a dew;
> Or that the Everlasting had not fix'd
> His canon 'gainst self-slaughter! O God! O God!

[1] Furnivall: Introduction to the "Leopold" Shakespeare, p. 72.
[2] Furnivall: *Op. cit.*, p. 70.

How weary, stale, flat, and unprofitable
Seem to me all the uses of this world!
Fie on 't! O fie! 'tis an unweeded garden
That grows to seed; things rank and gross in nature
Possess it merely. That it should come to this!
But two months dead! nay, not so much, not two;
So excellent a king; that was, to this,
Hyperion to a satyr; so loving to my mother
That he might not beteem the winds of heaven
Visit her face too roughly. Heaven and earth!
Must I remember? why, she would hang on him,
As if increase of appetite had grown
By what it fed on; and yet, within a month—
Let me not think on 't.—Frailty, thy name is woman!
A little month! or ere those shoes were old
With which she follow'd my poor father's body,
Like Niobe, all tears; why she, even she—
O God! a beast, that wants discourse of reason,
Would have mourn'd longer,—married with my uncle,
My father's brother, but no more like my father
Than I to Hercules. Within a month?
Ere yet the salt of most unrighteous tears
Had left the flushing in her galled eyes,
She married. O, most wicked speed, to post
With such dexterity to incestuous sheets!
It is not nor it cannot come to good;
But break my heart, for I must hold my tongue!"

But we can rest satisfied that this seemingly adequate explanation of Hamlet's weariness of life is a complete one only if we unquestionably accept the conventional standards of the causes of deep emotion. The very fact that Hamlet is content with the explanation arouses our gravest suspicions, for, as will presently be explained, from the very nature of the emotion he cannot be aware of the true cause of it. If we ask, not what *ought* to produce such soul-paralysing grief and distaste for life, but what in actual fact *does* produce it, we must go beyond this explanation and seek for some deeper cause. In real life speedy second marriages occur commonly enough without leading to any such result as is here depicted, and when we see them followed by this result we invariably find, if the opportunity for an analysis of the subject's mind presents itself, that there is some other and more hidden reason why the event is followed by this inordinately great effect. The reason always is that the event has awakened to increased activity mental processes that have been "repressed" from the subject's consciousness. His mind has been prepared for the catastrophe by previous mental processes, with which those directly resulting from the event have entered into association. This is perhaps what Furnivall means when he speaks of the world being made abominable to Hamlet's "diseased imagination." Further, to those who have devoted much time to the study of such conditions the self-description given here by

Hamlet will be recognised as a wonderfully accurate picture of a particular mental state that is often loosely and incorrectly classified under the name of "neurasthenia."[1] Analysis of such states always reveals the operative activity of some forgotten group of mental processes, which on account of their inacceptable nature have been "repressed" from the subject's consciousness. Therefore if Hamlet has been plunged into this abnormal state by the news of his mother's second marriage it must be because the news has awakened into activity some slumbering memory, which is so painful that it may not become conscious.

For some deep-seated reason, which is to him inacceptable, Hamlet is plunged into anguish at the thought of his father being replaced in his mother's affection by some one else. It is as though his devotion to his mother had made him so jealous for her affection that he had found it hard enough to share this even with his father, and could not endure to share it with still another man. Against this thought, suggestive as it is, may be urged three objections. First, if it were in itself a full statement of the case, Hamlet would easily have become aware of the jealousy, whereas we have concluded that the mental process we are seeking is hidden from him; secondly, we see in it no evidence of the arousing of an old and forgotten memory; and thirdly, Hamlet is being deprived by Claudius of no greater share of the Queen's affection than he had been by his own father, for the two brothers made exactly similar claims in this respect, namely those of a loved husband. The last-named objection, however, has led us to the heart of the situation. How if, in fact, Hamlet had in years gone by bitterly resented having to share his mother's affection even with his father, had regarded him as a rival, and had secretly wished him out of the way so that he might enjoy undisputed the monopoly of that affection? If such thoughts had been present to him in his child days they evidently would have been gradually suppressed, and all traces of them obliterated, by filial piety and other educative influences. The actual realisation of his early wish in the death of his father would then have stimulated into activity these suppressed memories, which would have produced, in the form of depression and other suffering, an obscure aftermath of his childhood's conflict.

I am aware that to those Shaksperian critics, who have enjoyed no special opportunities for penetrating into the obscurer sides of mental activities, and who base their views of human motive on the surface valuation given by the agents them-

[1] Hamlet's state of mind more accurately corresponds, as Freud has pointed out, with that characteristic of a certain form of hysteria.

selves—to whom all conduct whether good or evil at all events springs from conscious sources,—are likely to regard the suggestions put forward above as merely constituting one more of the extravagant and fanciful hypotheses of which the Hamlet literature in particular is so full. For the sake, however, of those who may be interested to apprehend the point of view from which this strange hypothesis seems probable I feel constrained to interpolate a few considerations on two matters that are not commonly appreciated, namely a child's feelings of jealousy and his ideas on death.

The whole subject of jealousy in children is one which arouses such prejudice that even well-known facts are either ignored or are not estimated at their true significance. Stanley Hall[1] in his encyclopædic treatise makes a number of very just remarks on the importance of the subject in adolescents, but implies that before the age of puberty this passion is of relatively little consequence. The close relation between jealousy and the desire for the removal of a rival by death, as well as the common process of suppression of these feelings, is clearly illustrated in a remark of his to the effect that: "Many a noble and even great man has confessed that mingled with profound grief for the death and misfortune of their best friends, they were often appalled to find a vein of secret joy and satisfaction, as if their own sphere were larger or better." A similar thought is more openly expressed by Bernard Shaw[2] when he makes Don Juan, in the Hell Scene, remark: "You may remember that on earth—though of course we never confessed it—the death of any one we knew, even those we liked best, was always mingled with a certain satisfaction at being finally done with them." Such cynicism in the adult is exceeded to an incomparable extent by that of the child with its notorious, and to the parents often heartbreaking, egotism, with its undeveloped social instincts and with its ignorance of the dread significance of death. A child unreasoningly interprets the various encroachments on its privileges, and the obstacles interposed to the immediate gratification of its desires, as meaningless cruelty, and the more imperative is the desire that has been thwarted the more pronounced is the hostility towards the agent of this cruelty. For a reason that will presently be mentioned, the most important encroachment in this respect, and the most frequent, is that made on the child's desire for affection. This hostility is very often seen on the occasion of the birth of a subsequent child, and is usually regarded with amusement as an added contribution to the general

[1] Stanley Hall: Adolescence, 1908, Vol. I, p. 358.
[2] Bernard Shaw: Man and Superman, 1903, p. 94.

gaiety called forth by the happy event. When a child, on being told that the doctor has brought him another playfellow, responds with the cry "Tell him to take it away again," he intends this, not, as is commonly believed, as a joke for the entertainment of his elders, but as an earnest expression of his intuition that in future he will have to renounce his previously unquestioned pre-eminence in the family circle, a matter that to him is serious enough.

The second matter, on which there is also much misunderstanding, is that of the attitude of a child towards the subject of death, it being commonly assumed that this is necessarily the same as that of an adult. When a child first hears of any one's death, the only part of its meaning that he realises is that the person is *no longer there*,[1] a consummation which in many cases he fervently desires. It is only gradually that the more dread implications of the phenomenon are borne in upon him. When, therefore, a child expresses the wish that a given person, even a near relative, would die, our feelings would not be so shocked as in fact they are, were we to interpret this wish from the point of view of the child. The same remark applies to the frequent dreams of adults in which the death of a near and dear relative takes place, for the wish here expressed is in most cases a long forgotten one, and one no longer directly operative.

Of the infantile jealousies the one with which we are here occupied is that experienced by a boy towards his father. The precise form of early relationship between child and father is in general a matter of vast importance in both sexes, and plays a predominating part in the future development of the child's character; this theme has been brilliantly expounded by Jung[2] in a recent essay. The only point that at present concerns us is the resentment felt by a boy towards his father when the latter disturbs his enjoyment of his mother's affection. This feeling, which occurs frequently enough, is the deepest source of the world-old conflict between father and son, between the young and old, the favourite theme of so many poets and writers. The fundamental importance that this conflict, and the accompanying breaking away of the child from the authority of his parents, has both for the individual and for society is clearly stated in the following passage of Freud's:[3] "Die Ablösung des heranwachsenden Individuums von der Autorität der Elt-

[1] See Freud: Traumdeutung, 1900, S. 175.

[2] Jung: Die Bedeutung des Vaters für das Schicksal des Einzelnen. Jahrbuch f. psychoanalytische u. psychopathologische Forschungen. 1909, Bd. I, I. Hälfte.

[3] Personal communication quoted by Rank, Der Mythus von der Geburt des Helden, 1909, S. 64.

ern ist eine der notwendigsten, aber auch schmerzlichsten Leistungen der Entwicklung. Es is durchaus notwendig, dass sie sich vollziehe, und man darf annehmen, jeder normal gewordene Mensch habe sie in einem gewissen Mass zu Stande gebracht. Ja, der Fortschritt der Gesellschaft beruht überhaupt auf dieser Gegensätzlichkeit der beiden Generationen." That it rests at bottom on sexual grounds was first demonstrated by Freud,[1] when dealing with the subject of the earliest manifestations of the sexual instinct in children. He has shewn[2] that this instinct does not, as is generally supposed, differ from other biological functions by suddenly leaping into being at the age of puberty in all its full and developed activity, but that like other functions it undergoes a gradual evolution and only slowly attains the form in which we know it in the adult. In other words a child has to learn how to love just as it has to learn how to run, although the former function is so much more intricate and delicate in its adjustment than the latter that the development of it is a correspondingly slower and more involved process. The earliest sexual manifestations are so palpably non-adapted to what is generally considered the ultimate aim and object of the function, and are so general and tentative in contrast to the relative precision of the later manifestations, that the sexual nature of them is commonly not recognised at all. This theme, important as it is, cannot be further pursued here, but it must be mentioned how frequently these earliest dim awakenings are evoked by the intimate physical relations existing between the child and the persons of his immediate environment, above all, therefore, his parents. As Freud has put it, "The mother is the first seductress of her boy." There is a great variability in both the date and the intensity of the early sexual manifestations, a fact that depends partly on the boy's constitution and partly on the mother's. When the attraction exercised by the mother is excessive it may exert a controlling influence over the boy's later destiny. Of the various results that may be caused by the complicated interaction between this and other influences only one or two need be mentioned. If the awakened passion undergoes but little "repression"—an event most frequent when the mother is a widow—then the boy may remain throughout life abnormally attached to his mother and unable to love any other woman, a not uncommon cause of bachelorhood. He may be gradually weaned from this attachment, if it is less strong, though it often happens

[1] Freud: Traumdeutung, 1900, S. 176-180. He has strikingly illustrated the subject in a recent detailed study, "Analyse der Phobie eines fünfjährigen Knabes." Jahrbuch f. psychoanalytische u. psychopathologische Forschungen, 1909, Bd. I, I• Hälfte.

[2] Freud: Drei Abhandlungen zur Sexualtheorie, 1905.

that the weaning is incomplete so that he is able to fall in love only with women that resemble the mother; the latter occurrence is a frequent cause of marriage between relatives, as has been interestingly pointed out by Abraham.[1] The maternal influence may also manifest itself by imparting a strikingly tender feminine side to the later character.[2] When the aroused feeling is intensely "repressed," and associated with shame, guilt, etc., the memory of it may be so completely submerged that it becomes impossible not only to revive it but even to experience any similar feeling, *i. e.*, of attraction for the opposite sex. This may declare itself in pronounced misogyny, or even, when combined with other factors, in actual homosexuality, as Sadger[3] has shewn.

The attitude towards the successful rival, namely the father, also varies with the extent to which the aroused feelings have been "repressed." If this is only slight, then the natural resentment against the father may later on be more or less openly manifested, a rebellion which occurs commonly enough, though the original source of it is not recognised. To this source many social revolutionaries owe the original impetus of their rebellion against authority, as can often be plainly traced—for instance in Shelley's case. If the "repression" is more intense, then the hostility towards the father is also concealed; this is usually brought about by the development of the opposite sentiment, namely of an exaggerated regard and respect for him, and a morbid solicitude for his welfare, which completely cover the true underlying relation. The illustration of the attitude of son to parent is so transpicuous in the Œdipus legend,[4] as developed for instance in Sophocles' tragedy, that the group of mental processes concerned is generally known under the name of the "Œdipus-complex."

We are now in a position to expand and complete the sug-

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[1] Abraham: Verwandtenehe und Neurose. Berl. Gesell. f. Psychiatr. u. Nervenkrankh, Nov. 8, 1908. Neurolog. Centralbl., 1908, S. 1150.

[2] This trait in Hamlet's character has often been the subject of comment. See especially Bodenstedt, Hamlet. Westermann's illustrierte Monatshefte, 1865; we mentioned above Vining's suggestion that Hamlet was really a woman. That the same trait was prominent in Shakspere himself is well known, a fact which the appellation of "gentle Will" sufficiently recalls.

[3] Sadger: Fragment der Psychoanalyse eines Homosexuellen. Jahrbuch f. sex. Zwischenstufen, 1908, Bd. IX. Ist die Konträre Sexualempfindung heilbar? Zeitschr. f. Sexualwissenschaft, Dez., 1908. Zur Ätiologie der konträren Sexualempfindung. Mediz. Klinik, 1909. Nr. 2.

[4] See Freud: Traumdeutung, 1900, S. 181. Interesting expositions of the mythological aspects of the subject are given by Abraham, Traum und Mythus, 1909, and Rank, *Op. cit.*

gestions offered above in connection with the Hamlet problem.[1] The story thus interpreted would run somewhat as follows: As a child Hamlet had experienced the warmest affection for his mother, and this, as is always the case, had contained elements of a more or less dimly defined erotic quality. The presence of two traits in the Queen's character go to corroborate this assumption, namely her markedly sensual nature, and her passionate fondness for her son. The former is indicated in too many places in the play to need specific reference, and is generally recognised. The latter is equally manifest; as Claudius says (Act IV, Sc. 7, l. 11), "The Queen his mother lives almost by his looks." Hamlet seems, however, to have with more or less success weaned himself from her, and to have fallen in love with Ophelia. The precise nature of his original feeling for Ophelia is a little obscure. We may assume that at least in part it was composed of a normal love for a prospective bride, but there are indications that even here the influence of the old attraction for his mother is still exerting itself. Although some writers, following Goethe,[2] see in Ophelia many traits of resemblance to the Queen, surely more striking are the traits contrasting with those of the Queen. Whatever truth there may be in the many German conceptions of Ophelia as a sensual wanton[3]—misconceptions that have been adequately disproved by Loening[4] and others—still the very fact that it needed what Goethe happily called the "innocence of insanity" to reveal the presence of any such libidinous thoughts in itself demonstrates the modesty and chasteness of her habitual demeanour. Her naïve piety, her obedient resignation and her unreflecting simplicity sharply contrast with the Queen's character, and seem to indicate that Hamlet by a characteristic reaction towards the opposite extreme had unknowingly been impelled to choose a woman who would least remind him of his mother. A case might

[1] Here, as throughout this essay, I closely follow Freud's interpretation given in the footnote previously referred to. He there points out the inadequacy of the earlier explanations, deals with Hamlet's feelings toward his mother, father and uncle, and mentions two other matters that will presently be discussed, the significance of Hamlet's reaction against Ophelia and of the fact that the play was written immediately after the death of Shakspere's father.

[2] Goethe: Wilhelm Meister, IV, 14. "Ihr ganzes Wesen schwebt in reifer, süsser Sinnlichkeit." "Ihre Einbildungskraft ist angesteckt, ihre stille Bescheidenheit atmet eine liebevolle Begierde, und sollte die bequeme Göttin Gelegenheit das Bäumschen schütteln, so würde die Frucht sogleich herabfallen."

[3] Storffrich: Psychologische Aufschüsse über Shakespeare's Hamlet, 1859, S. 131; Dietrich, *Op. cit.*, S. 129; Tieck: Dramaturgische Blätter, II, S. 85, etc.

[4] Loening: *Op. cit.*, Cap. XIII. Charakter und Liebe Ophelias.

further be made out for the view that part of Hamlet's courtship of Ophelia originated not so much in direct attraction for her as in a half-conscious desire to play her off against his mother, just as a disappointed and piqued lover is so often thrown into the arms of a more willing rival. When in the play scene he replies to his mother's request to sit by her with the words, "No, good mother, here 's metal more attractive," and proceeds to lie at Ophelia's feet, we seem to have a direct indication of this attitude, and his coarse familiarity and bandying of ambiguous jests with the woman he has recently so ruthlessly jilted are hardly intelligible unless we bear in mind that they were carried out under the heedful gaze of the Queen. It is as though Hamlet is unconsciously expressing to her the following thought: "You give yourself to other men whom you prefer to me. Let me assure you that I can dispense with your favours, and indeed prefer those of a different type of woman."

Now comes the father's death and the mother's second marriage. The long "repressed" desire to take his father's place in his mother's affection is stimulated to unconscious activity by the sight of some one usurping this place exactly as he himself had once longed to do. More, this someone was a member of the same family, so that the actual usurpation further resembled the imaginary one in being incestuous. Without his being at all aware of it these ancient desires are ringing in his mind, are once more struggling to find expression, and need such an expenditure of energy again to "repress" them that he is reduced to the deplorable mental state he himself so vividly depicts. Then comes the Ghost's announcement of the murder. Hamlet, having at the moment his mind filled with natural indignation at the news, answers with (Act I. Sc. 5. l. 29.),

> "Haste me to know 't, that I, with wings as swift
> As meditation or the thoughts of love,
> May sweep to my revenge."

The momentous words follow revealing who was the guilty person, namely a relative who had committed the deed at the bidding of lust.[1] Hamlet's second guilty wish had thus also been realised by his uncle, namely to procure the fulfilment of the first—the replacement of his father—by a personal deed, in fact by murder.[2] The two recent events, the father's

[1] It is not maintained that this was by any means Claudius' whole motive, but it evidently was a powerful one, and the one that most impressed Hamlet.

[2] Such murderous thoughts, directed against rival members of the same family, are surprisingly common in children, though of course it is relatively rare that they come to expression. Some years ago, in

death and the mother's second marriage, seemed to the world not to be causally related to each other, but they represented ideas which in Hamlet's unconscious fantasy had for many years been closely associated. These ideas now in a moment forced their way to conscious recognition in spite of all "repressing" forces, and found immediate expression in his almost reflex cry: "O my prophetic soul! My uncle?" For the rest of the interview Hamlet is stunned by the effect of the internal conflict in his mind, which from now on never ceases, and into the nature of which he never penetrates.

One of the first manifestations of the awakening in Hamlet's mind of the old conflict is the reaction against Ophelia. This is doubly conditioned, first by his reaction against woman in general, which culminates in the bitter misogyny of his outburst against her,[1] and secondly by the hypocritical prudishness with which Ophelia follows her father and brother in seeing evil in his natural affection, and which poisons his love in exactly the same way that the love of his childhood had been poisoned. On only one occasion does he for a moment escape from the sordid implication with which his love has been impregnated, and achieve a healthier attitude towards Ophelia, namely at the open grave when in remorse he breaks out at Laertes for presuming to pretend that his feeling for Ophelia could ever equal that of her lover. The intensity of the previous repulsion against woman in general, and Ophelia in particular, is an index of the powerful "repression" to which his sexual feeling is being subjected. The outlet for that feeling in the direction of his mother has always been firmly dammed by the forces making for "repression," and, now that the thin outlet for it in Ophelia's direction has also been closed, the increase of desire in the original direction consequent on the awakening of early memories tasks all his energy to maintain the "repression."

It will be seen from the foregoing that Hamlet's attitude towards his uncle is far more complex than is generally supposed. He of course detests his uncle, but it is the jealous detestation of one evil-doer towards his successful fellow.

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two editorial articles entitled "Infant Murderers" in the Brit. Jour. of Children's Diseases (Nov., 1904, p. 510, and June, 1905, p. 270), I collected a series of such cases, and, mentioning the constant occurrence of jealousy between young children in the same family, pointed out the possible dangers arising from the non-realisation by children of the significance of death.

[1] Act III, Sc. I, l. 149: "I have heard of your paintings too, well enough; God has given you one face, and you make yourselves another; you jig, you amble, and you lisp, and nickname God's creatures, and make your wantonness your ignorance. Go to, I'll no more on't; it hath made me mad."

Much as he hates him, he can never denounce him with the ardent indignation that boils straight from his blood when he reproaches his mother, for the more vigorously he denounces his uncle the more powerfully does he stimulate to activity his own unconscious and "repressed" complexes. He is therefore in a dilemma between on the one hand allowing his natural detestation of his uncle to have free play, a consummation which would make him aware of his own horrible wishes, and on the other ignoring the imperative call for vengeance that his obvious duty demands. He must either realise his own evil in denouncing his uncle's, or strive to ignore, to condone and if possible even to forget the latter in continuing to "repress" the former; his moral fate is bound up with his uncle's for good or ill. The call of duty to slay his uncle cannot be obeyed because it links itself with the call of his nature to slay his mother's husband, whether this is the first or the second; the latter call is strongly "repressed," and therefore necessarily the former also. It is no mere chance that he says of himself that he is prompted to the revenge "by heaven and hell," though the true significance of the expression of course quite escapes him.

Hamlet's dammed-up feeling finds a partial vent in other directions, the natural one being blocked. The petulant irascibility and explosive outbursts called forth by the vexation of Guildenstern and Rosencrantz, and especially of Polonius, are evidently to be interpreted in this way, as also is in part the burning nature of his reproaches to his mother. Indeed towards the end of the interview with his mother the thought of her misconduct expresses itself in that almost physical disgust which is so often the manifestation of intensely "repressed" sexual feeling.

> "Let the bloat king tempt you again to bed;
> Pinch wanton on your cheek; call you his mouse;
> And let him, for a pair of reechy kisses,
> Or paddling in your neck with his damn'd fingers,
> Make you to ravel all this matter out."

His attitude towards Polonius is highly instructive. Here the absence of family tie, and of other influences, enables him to indulge to a relatively unrestrained degree his hostility towards the prating and sententious dotard. The analogy he effects between Polonius and Jephthah[1] is in this connection especially pointed. It is here that we see his fundamental attitude towards moralising elders who use their power to

[1] What Shakspere thought of Jephthah's behaviour towards his daughter may be gathered from a reference in Henry VI, Part III, Act V, Sc. I. See also on the subject Wordsworth. On Shakespeare's knowledge and use of the Bible, 1864, p. 67.

thwart the happiness of the young, and not in the over-drawn and melodramatic portrait in which he delineates his father: "A combination and a form indeed, where every god did seem to set his seal to give the world assurance of a man."

In this discussion of the motives that move or restrain Hamlet we have purposely depreciated the subsidiary ones, which also play a part, so as to bring out in greater relief the deeper and effective ones that are of preponderating importance. These, as we have seen, spring from sources of which Hamlet is unaware, and we might summarise the internal conflict of which he is a victim as consisting in a struggle of the "repressed" mental processes to become conscious. The call of duty, which automatically arouses to activity these unconscious processes, conflicts with the necessity for "repressing" then still further; for the more urgent is the need for external action the greater is the effort demanded of the "repressing" forces. Action is paralysed at its very inception, and there is thus produced the picture of causeless inhibition which is so inexplicable both to Hamlet[1] and to readers of the play. This paralysis arises, however, not from physical or moral cowardice, but from that intellectual cowardice, that reluctance to dare the exploration of his inner mind, which Hamlet shares with the rest of the human race.

We have finally to return to the subject with which we started, namely poetic creation, and in this connection to enquire into the relation of Hamlet's conflict to the inner workings of Shakspere's mind. It is here maintained that this conflict is an echo of a similar one in Shakspere himself,[2] as to a greater or less extent it is in all men. It is, therefore, as much beside the point to enquire into Shakspere's conscious intention, moral or otherwise, in the play as it is in the case of most works of genius. The play is the form in which his

[1] The situation is perfectly depicted by Hamlet in his cry (Act IV, Sc. 4.):

> "I do not know
> Why yet I live to say 'This thing's to do,'
> Sith I have cause, and will, and strength, and means,
> To do't."

With greater insight he could have replaced the word "will" by "pious wish," which, as Loening (*Op. cit.*, S. 246) points out, it obviously means. Curiously enough, Rolfe (*Op. cit.*, p. 23) quotes this very passage in support of Werder's hypothesis that Hamlet was inhibited by the external difficulties of the situation.

[2] The view that Shakspere depicted in Hamlet his own inner self is a wide-spread one. See especially Döring, Shakespeare's Hamlet seinem Grundgedanken und Inhalte nach erläutert, 1865; Hermann, Ergänzungen und Berichtigungen der hergebrachten Shakespeare-Biographie, 1884; Taine, Histoire de la litérature anglaise; Vischer, Altes und Neues, 1882, Ht. 3.

feeling finds its spontaneous expression, without any inquiry being possible on his part as to the essential nature or source of that feeling.

This conclusion is amply supported by a historical study of the external circumstances of the play. It is well known that Shakspere took not only the skeleton but also a surprising amount of detail from earlier writings.[1] It is probable that he had read both the original saga as told early in the thirteenth century by Saxo Grammaticus, and the translation and modification of this published by Belleforest.[2] For at least a dozen years before Shakspere wrote Hamlet a play of the same name was extant in England, which modern evidence[3] has clearly shewn to have been written by Thomas Kyd. Ruder accounts of the story, of Irish and Norse origin, were probably still more widely spread in England, and the name Hamlet itself, or some modification of it, was very common in the Stratford district;[4] as is well known, Shakspere in 1585 christened his own son Hamnet, a frequent variation of the name. Thus the plot of the tragedy must have been present in his mind for some years before it actually took form as a play. In all probability this was in the winter of 1601-2, for the play was registered on July 26, 1602, and the first, piratical, edition appeared in quarto in 1603. Highly suggestive, therefore, of the subjective origin of the psychical conflict in the play is the fact that it was in September, 1601, that Shakspere's father died, an event which might well have had the same awakening effect on old "repressed" memories that the death of Hamlet's father had with Hamlet; his mother lived till some seven years later. There are many indications that the disposition of Shakspere's father was of that masterful and authoritative kind so apt to provoke rebellion, particularly in a first-born son.

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[1] No doubt much detail was also introduced by Shakspere from personal experience. For instance there is much evidence to shew that in painting the character of Hamlet he had in mind some of his contemporaries, notably William Herbert, later Lord Pembroke, (Döring, Hamlet, 1898, S. 35) and Robert Essex (Isaac, Hamlet's Familie. Shakespeare's Jahrbuch, Bd. XVI, S. 274). The repeated allusion to the danger of Ophelia's conceiving illegitimately may be connected with both Herbert, who was imprisoned for being the father of an illegitimate child, and the poet himself, who hastily married in order to avoid the same stigma.

[2] Belleforest: Histoires tragiques, T. V., 1564. This translation was made from the Italian of Bandello.

[3] See Fleay: Chronicle of the English Drama, 1891; Sarrazin: Thomas Kyd und sein Kreis, 1892; and Corbin: The Elizabethan Hamlet, 1895.

[4] Elton: William Shakespeare. His Family and Friends, 1904, p. 223.

It is for two reasons desirable here to interpolate a short account of the mythological relations of the original Hamlet legend, first so as to observe the personal contribution to it made by Shakspere, and secondly because knowledge of it serves to confirm and expand the psychological interpretation given above. Up to the present point in this essay an attempt has been made to drive the argument along a dry, logical path, and to shew that all the explanations of the mystery prior to Freud's end in blind alleys. So far as I can see, there is no escape possible from the conclusion that the cause of Hamlet's hesitancy lies in some unconscious source of repugnance to his task; the next step of the argument, however, in which is supplied a motive for this repugnance, is avowedly based on considerations that are not generally appreciated, though I have tried to minimise the difficulty by assimilating the argument to some commonly accepted facts. Now, there is another point of view from which this labour would have been superfluous, in that Freud's explanation would appear directly obvious. To any one familiar with the modern interpretation, based on psycho-analytic study, of myths and legends, that explanation of the Hamlet problem would immediately occur on the first reading through of the play. The reason why this strong statement can be made is that the story of Hamlet is merely an unusually elaborated form of a vast group of legends, the psychological significance of which is now, thanks to Freud and his co-workers, quite plain. It would absorb too much space to discuss in detail the historical relationship of the Hamlet legend to the other members of this group, and I shall here content myself with pointing out the psychological resemblances; Jiriczek[1] and Lessmann[2] have adduced much evidence to shew that the Norse and Irish variants of it are descended from the ancient Iranian legend of Kaikhosrav, and there is no doubt of the antiquity of the whole group, some members of which can be traced back for several thousand years.[3]

The theme common to all the members of the group is the success of a young hero in displacing a rival father. In its simplest form the hero is persecuted by a tyrannical father who has been warned of his approaching eclipse, but after marvellously escaping from various dangers he avenges himself, often

[1] Jiriczek: Hamlet in Iran., Zeitschr. des Vereins für Volkskunde, 1900, Bd. X.

[2] Lessman: Die Kyrossage in Europa. Wissenschaftliche Beil. z. Jahresbericht d. städt. Realschule zu Charlottenburg, 1906.

[3] In the exposition of this group of myths I am especially indebted to Otto Rank's excellent volume, Der Mythus von der Geburt des Helden, 1909, in which the original references may also be found.

unwittingly, by slaying the father. The persecution mainly takes the form of attempts to destroy the hero's life just after his birth, by orders that he is to be drowned, exposed to cold and starvation, or otherwise done away with. A good instance of this simple form is the Œdipus legend, in which the underlying motive is betrayed by the hero subsequently marrying his mother; the same occurs in the many Christian variants of this legend, for example, in the Judas Iscariot and St. Gregory ones. The intimate relation of the hero to the mother is also shewn in certain types of the legend (for example, the Ferdun, Perseus and Telephos ones) by the fact that the mother and son are together exposed to the same dangers. In some types the hostility towards the father is the predominating theme, in others the affection for the mother, but as a rule both of these are more or less plainly to be traced.

The elaboration of the more complex variants of the myth is brought about chiefly by three factors, namely: an increasing degree of distortion engendered by greater psychological "repression," complication of the main theme by other allied ones, and expansion of the story by repetition due to the creator's decorative fancy. In giving a description of these three processes it is difficult sharply to separate them, but they will all be illustrated in the following examples.

The *first* disturbing factor, that of more pronounced "repression," manifests itself by the same mechanisms that Freud has described in connection with normal dreams,[1] psychoneurotic symptoms, etc. The most interesting of these mechanisms in myth formation is that of "decomposition" (*Auseinanderlegung*), which is the opposite to the "condensation" (*Verdichtung*) mechanism so characteristic of normal dreams. Whereas in the latter process attributes of several individuals are fused in the creation of one figure, much as in the production of a composite photograph, in the former process various attributes of a given person are disunited and several individuals are invented, each endowed with one group of the original attributes. In this way one person, of complex character, gets replaced by several, each of whom possesses a different aspect of the character that in a simpler form of the myth was combined in one being; usually the different individuals closely resemble one another in other respects, for instance in age. A good example of this process is seen by the figure of the tyrannical father becoming split into two, a father and a tyrant. The resolution of the original figure is most often incomplete, so that the two resulting ones stand in a close relation to each other, being indeed as a rule members of the same

[1] See Abraham: Traum und Mythus, 1908.

family. The tyrant who seeks to destroy the hero is then most commonly the grandfather, as in the legends of Cyrus, Gilgam, Perseus, Telephos and others, or the grand-uncle, as in those of Romulus and Remus and their Greek predecessors, Amphion and Zethos; less often is he the uncle, as in the Hamlet legend. When the decomposition is more complete, the tyrant is not of the same family as the father, though he may be socially related, as in the case of Abraham whose father Therachs was the tyrant Nimrod's commander-in-chief; as a rule the tyrant is in this sub-group a stranger, as in the cases of Moses and Pharaoh, Feridun and Zohäk, Jesus and Herod, and others. In the last two instances, and in many others, not only are the mother and son, but also the father, persecuted by the tyrant, and we thus reach a still more complex variant, well represented by the Feridun legend, in which the son adores his father and avenges him by slaying their common enemy. The picture of the son as avenger instead of as slayer of the father therefore illustrates the highest degree of psychological "repression," in which the true meaning of the story is concealed by the identical mechanism that in real life conceals "repressed" hostility and jealousy in so many families, namely, exaggerated solicitude, care and respect. The dutiful Laertes avenging his murdered father Polonius is probably also an instance of the same stage in the development of the myth. Suppressed hate towards a father would seem to be adequately concealed by being thus masked by devotion and desire to avenge, and Shakspere's modification of the Hamlet legend is the only instance in which intense "repression" has produced still further distortion of the hero's attitude; in this legend, however, the matter is more complicated by the unusual prominence of the love for the mother over the hate for the father, and by the appearance of other factors such as the relationship of the tyrant to the father and to the mother.

Not only may the two above-mentioned attributes of the parent, fatherliness and tyranny, be split off so as to give rise to the creation of separate figures, but others also. For instance, the power and authority of the parent may be invested in the person of a king or other distinguished man, who may be contrasted with the lowly-born father.[1] In the present legend I think it probable that the figure of Polonius may be thus regarded as resulting from "decomposition" of the parental archetype, and as representing a certain group of qualities which the young not infrequently find an irritating feature in

[1] This important theme, which is fully dealt with by Freud and Rank, I have not here discussed, for it does not enter into the present legend. Abraham (*Op. cit.*, S. 40) has interestingly pointed out the significance of it in the development of paranoiac delusions.

their elders. The senile nonentity, concealed behind a show of fussy pomposity, who has developed a rare capacity to bore his audience with the repetition of sententious platitudes in which profound ignorance of life is but thinly disguised by a would-be worldly-wise air; the prying busybody whose meddling is, as usual, excused by his "well-meaning" intentions, constitutes a figure that is sympathetic only to those who submissively accept the world's estimate concerning the superiority of the merely decrepit.

The *second* disturbing factor is that due to the interweaving of the main theme of jealousy and incest between parent and child with other allied ones of a similar kind. We noted above that in the simplest form of decomposition of the paternal attributes the tyrannical *rôle* is most often relegated to the grandfather. It is no mere chance that this is so, and it is not fully to be accounted for by incompleteness of the decomposition. There is a deeper reason why the grandfather is most often chosen to play the part of tyrant, and this will be readily perceived when we recollect the large number of legends in which he has previously interposed all manner of obstacles to the marriage of his daughter. He opposes the advances of the would-be suitor, sets in his way various apparently impossible tasks and conditions—usually these are miraculously carried out by the lover,—and even locks up his daughter in an inaccessible spot, as in the legends of Gilgamos, Perseus, Romulus, Telephos and others. The motive is at bottom that he grudges to give up his daughter to another man, not wishing to part with her himself (Father-daughter complex). When his commands are disobeyed or circumvented, his love for his daughter turns to bitterness, and he pursues her and her offspring with insatiable hate. We are here once more reminded of events that may be observed in daily life by those who open their eyes to the facts. When the grandson in the myth avenges himself and his mother by slaying her tyrannical father, it is as though he clearly realised the motive of the persecution, for in truth he slays the man who endeavoured to possess and retain the mother's affection; thus in this sense we again come back to the father, and see that from the hero's point of view the distinction between the father and grandfather is not so radical as it at first sight appears. We perceive, therefore, that for two reasons the resolution of the original parent into a kind father and a tyrannical grandfather is not a very extensive one.

The foregoing considerations throw more light on the figure of Polonius in the present legend. In his attitude towards the relation between Ophelia and Hamlet are many of the traits that we have just mentioned to be characteristic of the Father-

daughter complex, though by the mechanism of rationalisation they are here skilfully cloaked under the guise of worldly-wise advice. Hamlet's resentment towards him is thus doubly conditioned, in that first Polonius, by the mechanism of "decomposition," personates a group of obnoxious elderly attributes, and secondly presents the equally objectionable attitude of the dog-in-the-manger father who grudges to others what he possesses, but cannot enjoy, himself. In this way, therefore, Polonius represents the repellant characteristics of both the father and the grandfather of mythology, and we are not surprised to find that, just as Perseus accidentally slew his grandfather Acrisios, who had locked up his daughter Danae so as to preserve her virginity, so does Hamlet "accidentally" slay Polonius, by a deed that resolves the situation as correctly from the dramatic as from the mythological point of view. With truth has this act been called the turning point of the play, for from then on the tragedy relentlessly proceeds to its culmination in the doom of the hero and his adversary.

The characteristics that constitute the Father-daughter complex are found in a similar one, the Brother-sister complex. This also may be seen in the present play, where the attitude of Laertes towards his sister Ophelia is quite indistinguishable from that of their father Polonius. Further, Hamlet not only keenly resents Laertes' open expression of his devoted affection for Ophelia—in the grave scene,— but at the end of the play kills him, as he had previously killed Polonius, in an accurate consummation of the mythological motive. That the Brother-sister complex was operative in the formation of the Hamlet legend is also evidenced by the incest between Claudius and the Queen, for from a religious point of view the two stood to each other in exactly the same relationship as do brother and sister. This conclusion may further be supported by the following—avowedly more tentative—considerations. The preceding remark about the two main traits in Polonius, those characteristic of a pompous father of a son and a grudging father of a daughter, gives room for the supposition that his family was in a sense a rough duplicate of the main family in the legend. This notion of duplication of the principal characters will be mentioned in more detail in the next paragraph, and the present line of thought will then perhaps become clearer. In the sense here taken Laertes would therefore represent a brother of Hamlet, and Ophelia a sister. This being so, we would seem to trace a still deeper ground for the original motives of both Hamlet's misogynous turning from Ophelia, and his jealous resentment of Laertes. As, however, this theme of the relation between siblings is of only secondary interest in the Hamlet legend, discussion of it will be reserved

for other legends in which it is more prominent (*e. g.*, those of Cyrus, Karna, etc.).

The *third* factor to be considered is the process technically known to mythologists as "doubling" of the principal characters. The chief motive for its occurrence seems to be the desire to exalt the importance of these, and especially to glorify the hero, by decoratively filling in the stage with lay figures of colourless copies whose neutral movements contrast with the vivid activities of the principals. This factor is sometimes hard to distinguish from the first one, for a given multiplication of figures may subserve at the same time the function of decomposition and that of doubling. In general it may be said that the former function is more often fulfilled by the creation of a new person who is a relative of the principal characters, the latter by the creation of a person who is not a relative; this rule however has many exceptions. In the present legend Claudius seems to subserve both functions, and it is interesting to note that in many legends it is not the father's figure who is doubled by the creation of a brother, but the grandfather's. This is so in some versions of the Perseus legend, and, as was mentioned above, in those of Romulus and Amphion; in all three of these the creation of the king's brother, as in the Hamlet legend, subserves the functions of both decomposition and doubling. Good instances of the simple doubling processes are seen in the case of the maid of Pharaoh's daughter in the Moses legend, or of many of the figures in the Cyrus one.[1] Perhaps the purest examples of doubling in the present play are the colourless copies of Hamlet presented by the figures of Horatio, Marcellus and Bernardo. Laertes and the younger Fortinbras, on the other hand, are examples of both doubling and decomposition of the main figure. The figure of Laertes is more complex than that of Fortinbras in that it is composed of three components instead of two; he evinces, namely, the influence of the Brother-sister complex in a way that contrasts with the "repressed" form in which this is manifested in the central figures of the play. Hamlet's jealousy of Laertes' interference in connection with Ophelia is further to be compared with his resentment of the meddling of Guildenstern and Rosencrantz. These are therefore only copies of the Brother of mythology, and, like him, are killed by the hero; in them is further to be detected a play on the "Twin" motive so often found in mythology, but which need not be further developed here. Both Laertes and Fortinbras represent one "decomposed" aspect of the hero, namely that concerned with revenge for a murdered or injured father.

[1] This is very clearly pointed out by Rank, *Op. cit.*, S. 84, 85.

It is instructive to note that neither of them shew any sign of inhibition in the performance of this task, and that with neither is any reference made to his mother. In Hamlet, on the other hand, in whom "repressed" love for the mother is even more powerful than "repressed" hostility towards the father, inhibition appears; this is because the stronger complex is stimulated by the fact that the object of revenge owes his guilt to the desire to win the mother.

The important subject of the actual mode of origin of myths and legends, and the relation of them to infantile fantasies, will not here be considered,[1] as our interest in the topic is secondary to the main one of the play of Hamlet as given to us by Shakspere. Enough perhaps has been said of the comparative mythology of the Hamlet legend to shew that in it are to be found ample indications of the working of all forms of incestuous fantasy. We may summarise the foregoing considerations of this part of the subject by saying that the main theme of this story is a highly elaborated and distorted account of a boy's love for his mother and consequent jealousy of and hostility towards his father; the allied one in which the sister and brother respectively play the same part as the mother and father in the main theme is also told, though with secondary interest.

Last of all in this connection may be mentioned on account of its general psychological interest a matter which has provoked much discussion, namely Hamlet's so-called "simulation of madness."[2] The traits in Hamlet's behaviour thus designated are brought to expression by Shakspere in such a refined and subtle way as to be not very transpicuous unless one studies them in the original saga. In the play Hamlet's feigning mainly takes the form of fine irony, and serves the purpose of enabling him to express contempt and hostility in an indirect and disguised form (*indirekte Darstellung*). His conversations with Polonius beautifully illustrate this mechanism. The irony in the play is a transmutation of the still more concealed mode of expression adopted in the saga, where the hero's audience commonly fails to apprehend his meaning. Of this, Saxo Grammaticus writes.[3] "Falsitatis alienus haberi cupiens, ita astutiam veriloquio permiscebat, ut nec dictis veritas deesset nec acuminis modus verorum indicio proderetur." Here Hamlet plainly adopts his curious behaviour in order to further his scheme of revenge, to which, as we shall presently note, he had

[1] Those interested in this subject are referred to the writings of Freud, Abraham, Rank and Riklin.

[2] My attention was kindly called to this point by a personal communication from Professor Freud.

[3] Quoted after Loening: *Op. cit.*, S. 249.

in the saga whole-heartedly devoted himself. The actual mode of operation of his simulation here is very instructive to observe, for it gives us the clue to a deeper psychological interpretation of the process. His conduct in this respect has three characteristics, first the obscure and disguised manner of speech just referred to, secondly a demeanour of indolent inertia and purposelessness, and thirdly conduct of childish and at times almost imbecillic foolishness (*Dummstellen*); the third of these is well exemplified by the way he rides into the palace seated backwards on a donkey. His motive in so acting was, by playing the part of a harmless fool, to deceive the king and court as to his projects of revenge, and unobserved to get to know their plans and intentions; in this he admirably succeeded. It has been maintained that even in the play this motive of spying on the king and disarming his suspicions was at work, but even if this was the case, and there are grave reasons for doubting it,[1] it is certainly more evident in the saga. Now, in observing the kind of foolishness simulated by Hamlet in the saga, we cannot help being impressed by the *childish* characteristics it throughout manifests, and Freud points out how accurately it resembles a certain type of demeanour adopted at times by some children. The motive with these children is further a like one, namely to simulate innocence and an exaggerated childishness, even foolishness, in order to delude their elders into regarding them as being "too young to understand" and even into altogether ignoring their presence. The reason for the artifice with such children most frequently is that by this means they may view and overhear various private things which they are not supposed to. It need hardly be said that the curiosity thus indulged in is in most cases concerned with matters of a directly sexual nature; even marital embraces are in this way investigated by quite young children far more frequently than is generally supposed. The subject is one that would bear much exposition, but it would be too far from the main theme of this essay to render justifiable its inclusion here.

It is highly instructive now to note the respects in which Shakspere's plot deviates from that of the original saga; we are, of course, not here concerned with the poetic and literary representation, which not merely revivified an old story, but created an entirely new work of genius. The changes are mainly two[2] in number. The first is as follows: in the saga Claudius

[1] See on the point Loening. *Loc. cit.*, and S. 387.

[2] Lesser points, important as they are, cannot here be followed out. Such is for instance the way Shakspere accepts Belleforest's alteration of the original saga in making the Queen commit incest during the life of her first husband. The significance of this will be obvious to those who have followed the argument above presented.

(or Fengo, as he is here called) had murdered his brother in public, so that the deed was generally known, and further had with lies and false witnesses sought to justify it in that he pretended it was done to save the Queen from the threats of her husband.[1] This view he successfully imposed on the nation so that, as Belleforest[2] has it, "son peché trouva excuse à l'endroit du peuple et fut reputé comme justice envers la noblesse —et qu'au reste, en lieu de le poursuyvre comme parricide[3] et incestueux, chacun des courtisans luy applaudissoit et le flattoit en sa fortune prospere." When Shakspere altered this to a secret murder known only to Hamlet it would seem as though it was done, consciously or unconsciously, to minimise the external difficulties of Hamlet's task, for it is obviously harder to rouse a nation to condemn a crime that has been openly explained and universally forgiven than one which has been guiltily concealed. If Shakspere had retained the original plot in this respect there would have been more excuse for the Klein-Werder hypothesis, though it is to be observed that even in the saga Hamlet unhesitatingly executed his task, herculean as it was. Shakspere's rendering makes still more conspicuous Hamlet's recalcitrancy, in that it disposes of the only justifiable plea for non-action.

The second and all-important respect in which Shakspere changed the story, and thus revolutionised the tragedy, is the vacillation and hesitancy he introduced into Hamlet's attitude towards his task, with the consequent paralysis of his action. In all the previous versions Hamlet was throughout a man of rapid decision and action, not—as with Shakspere's version—in everything except in the task of vengeance. He had, as Shakspere's Hamlet felt he should have, swept to his revenge unimpeded by any doubts or scruples, and had never flinched from the straightforward path of duty. With him duty and natural inclination went hand in hand; from his heart he wanted to do that which he believed he ought to do, and was thus harmoniously impelled by both the summons of his conscience and the cry of his blood. There was none of the deep-reaching conflict that was so disastrous to Shakspere's Hamlet. It

[1] Those who are acquainted with Freud's work will have no difficulty in discerning the sadistic origin of this pretext. (See Sammlung kleiner Schriften, Zweite Folge, 1909, S. 169.) The interpretation of an overheard coitus as an act of violence offered to the mother is frequently an aggravating cause of hostility towards the father.

[2] Quoted after Loening, *Op. cit.*, S. 248.

[3] This should of course be fratricide, though the word parricide was occasionally used in old French to denote a murder of any elder relative. It is conceivable that the mistake is a "*Verschreiben*," unconsciously motived in Freud's sense. (See Psychopathologie des Alltagslebens, 1907, Cap. VI.)

is as though Shakspere had read the previous story and realised that had *he* been placed in a similar situation he would not have found the path of action so obvious as was supposed, but on the contrary would have been torn in a conflict which was all the more intense for the fact that he could not explain its nature. In this transformation Shakspere exactly reversed the plot of the tragedy, for, whereas in the saga this consisted in the overcoming of external difficulties and dangers by a single-hearted hero, in the play these are removed and the plot lies in the fateful unrolling of the consequences that result from an internal conflict in the hero's soul. From the struggles of the hero issue dangers which at first did not exist, but which, as the effect of his untoward essays, loom increasingly portentous until at the end they close and involve him in final destruction. More than this, every action he so reluctantly engages in for the fulfilment of his obvious task seems half-wittingly to be disposed in such a way as to provoke destiny, in that, by arousing the suspicion and hostility of his enemy, it defeats its own object and helps to encompass his own ruin. The conflict in his soul is to him insoluble, and the only steps he can make are those that inexorably draw him nearer and nearer to his doom. In him, as in every victim of a powerful unconscious conflict, the Will to Death is fundamentally stronger than the Will to Life, and his struggle is at heart one long despairing fight against suicide, the least intolerable solution of the problem. Being unable to free himself from the ascendency of his past he is necessarily impelled by Fate along the only path he can travel—to Death. In thus vividly exhibiting the desperate but unavailing struggle of a strong man against Fate, Shakspere achieved the very essence of the Greek conception of tragedy.

There is therefore reason to believe that the new life which Shakspere poured into the old tragedy was the outcome of inspirations that took their origin in the deepest and most hidden parts of his mind. He responded to the peculiar appeal of the story by projecting into it his profoundest thoughts in a way that has ever since wrung wonder from all who have heard or read the tragedy. It is only fitting that the greatest work of the world-poet should have been concerned with the deepest problem and the intensest conflict that has occupied the mind of man since the beginning of time, the revolt of youth and of the impulse to love against the restraints imposed by the jealous eld.

SPONTANEOUS CONSTRUCTIONS AND PRIMITIVE ACTIVITIES OF CHILDREN ANALOGOUS TO THOSE OF PRIMITIVE MAN[1]

R. A. ACHER

Much has been said of late years about following the child's native interests and instincts in directing its education. But if we ask just what these interests and instincts are the answer is not so readily given. A different answer would very probably be given by different leaders in this field. Children grow up in an environment adjusted largely to adult life and adult ideals, and are still pretty firmly in the grip of the traditional school system. Therefore their spontaneous activities are still more or less obscured and neglected. But it is just here that most may be learned about children's instincts and interests. These are nowhere more fully revealed than in their spontaneous activities, plays and constructions. It is here that they get away from the influence of adult life and complex society at least partially, and build up their simple crude world with all its primitive aspects and attributes. They thus give expression to their mental and physical capacities and needs. These activities of children have not received the attention which they merit, although considerable valuable work of this kind has already been done. The pity is that what we do know in this field as a result of previous study is not more fully applied. The student of child study who is familiar with the material that has been collected in the past two decades on this subject cannot but be impressed with the great difference which exists between the theory of education which this child study investigation suggests on the one hand and the theory which under-

[1] Acknowledgments for returns are due to Miss Lillie A. Williams, New Jersey State Normal School; Mr. W. S. Munroe, of the Westfield, Mass., Normal School; Miss Frances Judson, of the Chicago Kindergarten Institute, and Margaret Pritchard, of the Philadelphia Normal School for Girls.

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lies much of the actual school work on the other. It is quite evident that there are many instincts and interests of children already revealed by these investigations which are not taken account of and utilized by the school programme of to-day.

The following investigation of children's spontaneous constructions and primitive activities is made in the hope that something of value may be added to the large mass of data already collected on this subject and that a clearer, saner insight into the child's nature and needs may follow.

The minute details of the investigation are given so that the picture of the children's activities may be as complete as possible. No effort is made to interpret all these facts, a statement of the facts being thought worth while.

Some attention is also given to the analogy between the children's activities and constructions and those of primitive man with the view of throwing some light on the possible origin of these activities and constructions of children. It is very improbable that the child begins life with a clean slate, so to speak, and that imitation and experience account solely for his early activities. Even the idea of Groos that children are somehow preparing for their later life work seems hardly tenable, except in so far as it is incidentally the case. Investigators are coming to recognize a psychic evolution as well as a physical one. From this point of view the mental life of man cannot be adequately understood except by a consideration of its phylogenetic origin. The child's mental and physical life according to this view, is largely a budding forth of the early, vital, racial experiences. That is, in the evolution of the race its reactions towards its environment became a part of the vital inheritance of the generations following. The part which the unconscious psychic influence played in this evolution is now thought to be far greater than was ever heretofore thought to be the case. How far this is true and what part is played by imitation and the experience of the individual cannot of course be stated. But when children seize upon a certain line of activity with enthusiasm, and delight and persist in it for more or less extended periods of time, there is certainly more at the basis of this phenomenon than mere imitation. For frequently they give expression to unique and original ideas. Again, when these activities are very similar to those which the race very probably experienced in its early history, we are certainly justified in giving some consideration to their phylogenetic origin.

The significance of this view, if true, for purposes of education can hardly be overestimated. It thus becomes the imperative duty of educators to follow this course of development and work with the current of psychic evolution and not against it as is so often the case at present.

In order to compare children's activities more readily with those of the race this investigation was made along the lines of their spontaneous constructions and play with blocks, stones, sand and earth, and snow; their use of strings, points and edges, and their striking and throwing propensities were also considered. Their attitude towards clothing and their desire to modify their bodily form also received attention. The material was largely gathered from the returns of a questionnaire which was answered by the students of several normal schools. Thus the returns have the merit of coming from teachers or persons expecting to become teachers and actively engaged in preparation for their work. Those who had the questionnaire in charge in these schools were trained in collecting data by this means. This greatly increases the value of the material thus gathered.

Blocks

The reports, covering observations of 186 boys and 269 girls, show that the tendency on the part of children to use blocks for purposes of construction is very marked. It begins even before the third year and continues up through the seventh year. There is great satisfaction in this and hours are often spent in constructing a great variety of things. The material used indicates that if they have not one thing with which to build they will use any other which lends itself to their purposes. This is shown by the fact that when blocks were not available they used bricks, dominoes, spools, corn cobs, pine cones, sticks of wood, boards and blocks from the builder's discarded pile. The usual construction is a house, this being mentioned in the majority of cases. What does it take to satisfy the child's idea of a house? Very young children are satisfied with a solid mass of blocks with no definite form. Somewhat later blocks are placed in two rows with a space between and another row of blocks on top for a roof; or a board may be used for a roof. Many varieties of this are built due to the difference in age and ingenuity of the children. Some omit blocks in the building for doors and windows, and put steps before the door, lay walks leading from the house and may even put a block before the opening supposed to be the door in such a way as to show the door ajar. Others make simply rectangular hollow forms with no provision for either doors or windows. Again others build two or even three stories, with pasteboard or something of the kind for floors, and partitions of blocks between the rooms. These various rooms are often appropriately furnished blocks representing the various articles of furniture. Many children centre upon some one part of a house or other building as for example a fireplace, chimney, stair steps, post-office boxes, pew and altar or church steeple, etc., and omit all

else without any feeling of incompleteness whatever. On the other hand not a few children of similar age go far towards completing the whole surroundings; not only representing all parts of the house in a rude way, including bay windows, piazzas, and perhaps a tower, but even completing the yard with fence around it and gate leading to the road. This gate is frequently rather elaborate with two blocks for posts and another on top of these; or else an arch is built over the gateway. Some extend this so as to represent a whole farm, or even a rural community, or village. The farm includes usually a barn with stable and horses in it, henhouse, pigpen, fences, fields, with cows in some of them. The village consists of store, postoffice, church, shops and streets.

Several interesting things are revealed by this building. In the first place the vagueness of children's ideas is beautifully shown here. They have the crudest notions of even the most familiar objects. Of course some allowance must be made for their inability to execute and embody their ideas in objective form. But their incomplete notion of objects is shown by the fact that they often emphasize one or the other part of an object to the exclusion of other perhaps more important parts, and still consider it complete; for example, the chimney, stair steps, or steeple is called a house or church; a well may be built on top of the ground with blocks and offer no difficulty whatever.

Children rarely undertake to produce a copy of their own house or other buildings with which they are familiar. Only a very few cases are reported in which this was attempted. The children seem to have vague conceptions of their own, the expression of which is more satisfying to them than the making of a copy of one they are acquainted with. The house which they build is sometimes called a mansion, or castle, of which they have heard some story or fairy tale. It may be one which they are going to have when they grow up. It thus seems that the child can more readily represent a type of any familiar object than he can produce a copy of it.

Other forms of construction are towers, pyramids, columns, and steeples. These were mentioned in about 75 per cent. of the reports. The chief aim is to build them as high as possible, the higher the more delighted is the builder. The blocks are either all used in this building or else piled up until the tower falls. The falling of the tower is enjoyed very much and often it is pushed over with great pleasure. These towers are built in various ways; sometimes two blocks are set upright and a third placed across the top, and others placed similarly on top of these. Others pile them in rectangular columns with square bases or in the form of a pyramid. The steeple of the church

is usuallythe principal part of the building, and is built high as possible. It is quite evident from the returns that children derive especial satisfaction from placing the blocks one upon the other. This seems to be one of the first uses which they learn to make of them, and is continued through the block-building period. Another interesting exercise is to place dominoes or other similar blocks in such position that when one is pushed over it pushes over the one next to it and so on until all are down. These rows are often made as crooked as possible to still accomplish the end desired. The child seems to learn for the first time that it has the power to arrange blocks so that the result will be greater and farther reaching than is ordinarily the case. It learns to extend its power of doing things in a new and, to it, surprising way. This is also done in piling up the blocks and having them fall.

Other things which are built are walls enclosing space which may be called a sheepfold for protection against wolves. Or they may be protection against enemies of the children, or prisons. They are varied in shape, often circular or some other odd form. Children also build engines, cars, bridges, smokestack, blacksmith shop, boat, Noah's ark, fountain, mountain, fire engine, park, etc.

The important fact here is not their success or failure in attempting any of these things; but rather that they would undertake to represent such varied and often complex things. The interest which children manifest in this construction play could certainly be turned to great advantage in their physical and mental development, if properly utilized. Both the home and the kindergarten and even the lower grades could do much more than is done in providing for and encouraging this interest. The possibilities here have not yet been fully developed. If the blocks were made somewhat larger than is ordinarily the case and of heavier material, the child would get excellent exercise in making these constructions. The effort of the child to put into objective form his ideas is certainly stimulating in the highest degree, and its encouragement would do more for the child than much of the more abstract work that is being done in the schools of to-day. The study by the teacher of these crude efforts of the child would be a very profitable thing. In no other possible way can one get a better notion of the child's limitations and difficulties than by a sympathetic study of these early constructions.

Sand and Earth

Just what do children construct with sand and earth and how do they play with it? The returns fully agree with common observation in that they show that children like very much to

play with sand and earth. Here also a great variety of constructions are attempted, and as children continue their interest in this sort of construction to a much later period than with blocks they produce much more elaborate and complex structures. Perhaps the most favored effort of the children is that of well-digging. Both boys and girls enjoy it. Here, as elsewhere, the age and natural aptitude of the children determine the nature of the product. The younger children merely dig holes in the ground and fill them with water. When a little older they often dig a deep, wide hole wall it up with boards or even with stones and make it have more the appearance of a real well. Some of the older children even struck water and made a real well. Two boys 10 and 11 dug a well 6 feet deep and walled it up.

Some children like to dig holes into the ground without any definite purpose. These are of various sizes and depth and are often called a lake or pit. A favorite effort is to dig tunnels between two holes. The digging of underground passages seems to have a peculiar fascination for children. Canals and ditches to conduct water are also interesting to them.

The greatest delight, especially for the boys, is digging caves. There seems to be a peculiar interest in digging a hole big enough to contain three or four boys, and then covering it up and concealing it so that no one can find it but the ones who dug it. Here much time is spent in hiding from people, eating fruit and other food pilfered from the pantry, etc. Girls rarely participate in this and when they do they assist their brothers and do not take the initiative. The ages of both boys and girls range from 7 to 15 years. The greater number are from 11 to 15. These caves vary in complexity from mere holes in the bank or ground to large sheltered rooms connecting with each other by passageways. Several illustrations may make clear their plans.

"Three boys, 10 to 11 years, dug cave in hillside. Covered floor with pine needles, hung burlap across doorway and lighted it with tallow candles. Here potatoes were roasted and eaten, and hours spent every day." "M— 14, and others, dug cave in river bank, had stove and furniture in it; also fishing tackle, boat and oars. Kept it in good shape. Stole watermelons, apples and chickens of neighborhood and ate them." The work that is often done in constructing these caves is almost incredible for boys of this age. Just recently the writer has had an excellent opportunity to observe a case of digging and building such a cave house. A boy of 12 and his 10-year-old sister conceived the idea of digging out the central portion of a mound about six or seven feet high and eighteen or twenty feet in diameter, and then constructing a house of this by placing

board walls on the sides and erecting a roof over the top. They also made arrangements for a chimney and for at least two rooms, and fully expected to sleep in it at night. Although the boy is regarded even by his father as having an aversion to work of any kind, he went to work with such enthusiam that the digging was completed in a few days. Several tons of earth were removed and part of it wheeled some distance from where it was dug. His sister also worked at it, and he pressed as many of his companions into the service as he could but, nevertheless, the bulk of the work was done by the boy. He persisted from day to day until the digging was completed. His plans are elaborate and the problems which he will have to solve before completing it will be many and complex.

It is very evident that the interest in these semi-cave-houses leads boys to do a great amount of labor, planning and devising. The educational value of this is by no means unimportant. It brings them face to face with practical difficulties and problems and gives them a chance to use their inventive genius. From this point of view what might ordinarily seem to be sheer nonsense and a waste of time and energy becomes a means of development that can hardly be equalled in any other way. These activities should therefore receive the most careful consideration by adults. Here, as elsewhere, the great gap between youth and maturity must constantly be kept in mind if the right attitude is to be maintained towards these activities of children and youth.

The house-building propensities of children with blocks and then a little later by digging into the earth, and also into the snow, as will be seen later in this paper, indicates pretty clearly a deep-seated basis for these constructions. Imitation seems hardly sufficient to account for them; for many of the structures are widely different from any which the children have seen. It might be argued that since children are immature both physically and mentally we should expect them to build just such structures as they construct and as savages might build. But this fails to account for the universal and intense interest in this form of activity. We are almost forced to conclude that it is the expression of the psychic tendency formed not only in early man but in many of the higher animals to build some sort of habitation.

Another prominent interest of children is shown in their desire to bury things. Nearly all the children mentioned in the returns were at some time much interested in this. Among the objects buried were broken dolls, birds, chickens, cats, dogs, mice, grasshoppers, marbles, knives, books. In most of these cases the burial is for the purpose of disposing of the dead body of the animal. The burials are generally conducted

in groups and with more or less ceremony. Flowers are in evidence and the mourners make their demonstrations with some real feeling. The body is wrapped in some kind of cloth, placed in a small box and then lowered into the grave and covered. For days and even weeks afterwards the grave is visited and sometimes flowers placed upon it. Sometimes the grave is reopened and an inspection is made of the body. Children here become acquainted with the mystery of death in a way that may prepare them for the ordeal of burying some one of those nearest them later.

Some children seem to enjoy burying anything, such as knives, forks, spoons, pins, thimbles, spools. Several from 3 to 5 years of age buried playthings or pennies, expecting them to grow. Others buried marbles, toys, books, to keep them. One girl of 4, planted a ring expecting it to grow into a large ring.

Children also like to partially bury themselves or others in the sand. Usually the whole body is covered except the head, but sometimes only the hands and feet are buried.

The other objects made with sand and mud are many and varied. Chief among these are mud pies, cakes, houses, mounds, forts, walks, bridges, dams, animals, people, dishes, farms, villages. The making of mud pies and cakes seems to be limited largely to the girls. The returns show that 158 girls made these but only 4 boys. Houses are built by both boys and girls. They consist of various degrees of complexity from mere heaps of sand with small holes for windows and doors to houses with several rooms, yard with fence around it, flower beds, paths, driveways, barn, pigpen, well, trees or small twigs, even communities and villages are attempted. These are of course miniature in size. Some make an Eskimo house by burying one hand under a heap of sand, packing it tightly and then gently removing the hand.

Mounds are made by piling the sand several feet high. Sometimes they are tunneled through. Forts and walls of various sizes are also built. Animal and human forms are attempted in sand and mud. These are of all degrees of perfection from the rudest representation up to full figures with arms, legs, features. Since these same things are done by children with snow, a more complete discussion will be given under that subject.

Stones

The data on stones is treated under the following heads: Things made of stones; collections of stones; charms and amulets; breaking and chipping stones, pounding stones together and using them as hammers; stones set on edge or

superposed. Each of these will be discussed in the order given.

It is evident that stones enter largely into the play of children. In nearly all the returns, including 281 girls and 101 boys from 5 to 9 years of age, were found statements such as these, "I liked to play with stones in my childhood." "I played much with stones." There were reported more than thirty different uses made of stones. Their use in making playhouses was most prominent, it being mentioned in one hundred and twenty-two reports. The houses are very simply represented and usually consist of only one or two rooms; but in a few cases four or five rooms were mentioned. The walls are merely rows of stones on the ground with blank spaces for doors and windows, and single rows of stones to represent the rooms. In only four per cent. of the cases were the stones superposed and an effort made to enclose the rooms on all sides and construct a roof. Thus we see again that the child's conception of a house is not very clear and is easily satisfied. This will be illustrated again in the other parts of this paper. A few quotations will show what was done:

F., at 7. "Made outline of house with stones, leaving space for door and windows, and left stone to knock on when any one wanted to come in."

F., at 6. "Marked off the extent of my playhouse with stones placed end to end."

F., at 8. "Marked off playhouse with white stones, also rooms."

The houses were rarely large enough for the children to enter them. The merest hint of walls and rooms was entirely satisfactory for a complete house. Two sides and one end often sufficed for a house. In fifteen cases mention is made of dividing lines or partition walls within the houses to separate rooms. One girl reports that she built a playhouse with walls four layers wide and two feet high and representing a real house in number of rooms. Four houses were built like caves and were called cave houses. One boy said, "I made a cave house out of stones and some boys claimed it as theirs and I had to drive them out." Whenever a house was large enough they would always crawl into it, as is shown by the following typical case: "Built playhouse which was simply stone walls with cornstalks for roof into which we often crawled."

The houses were supplied with furniture and kitchen utensils in 44 cases. Smooth, flat stones were used as tables and chairs for tea parties. Various shaped stones and granite chips were used for dishes. Beds for dolls were made of stones in one corner of the room. Ovens and furnaces were mentioned several times. They were built by placing flat stones on bot-

tom, and placing others on the sides and then placing a flat stone on top.

The next most frequent use that was made of stones was playing store or some other form of interchange. Stones were used as articles of food or merchandise in 45 cases and as money in 42 cases. When used as articles of food they were marked in some way or else different shapes were the distinguishing marks. When used as money the distinction depended upon the size or color of the stones. Stones represented all kinds of groceries such as eggs, nutmegs, lump sugar, apples, potatoes, raisins on cake, candy, various kinds of cakes, etc. In 2 cases scales were mentioned in connection with store play. These consisted of boards balanced on a rock.

Bright, sparkling stones were used as decorations for the rooms. Some decorations were made by pressing stones into the sand so as to make pictures of animal forms or human faces. In 43 cases stones were used to form the border of flower beds, walks and roads. The stones so used were carefully selected and arranged with an effort to make a beautiful effect.

In thirty cases gardens were made in connection with the house by laying rows of stones around a plot of ground or setting them upright so as to make a fence or wall. 75 children used stones as a means of separating different tracts of land from each other. A frequent expression was "Marked off extent of homes and gardens in play so claims would not overlap and cause trouble." Only eight children constructed barns in addition to their houses and in no case was a barn built without a house. The dawning of child consciousness is nowhere more fully revealed than in these early constructions of children, and for this reason the details have been so minutely given.

The use of stones in damming up streams was mentioned in the play of 29 children. This was done either to make a lake or to make a waterfall or rapids; this seems to have been a habit with some immediately after a rain in the spring and early summer. The making of bridges was mentioned 9 times and the making of canals and dykes once. The bridges were formed by throwing stones into the water until they extended above its surface. One little girl built an arch across a small stream by setting stones on end and leaning them against each other and then piling others on top of them.

The graves of dead pets such as cats, chickens, birds, dogs, etc., were marked with stones by fifteen children. The following are typical statements: "Placed stone at grave of canary." "Got chips from the marble cutters and used them as grave stones for bird and cat." The ceremony accompanying these burials and the erection of the tombstones was more

or less elaborate and in a few cases the initials of the pet's name were scratched or written on the stone.

Sixteen references were made to the use of stones for marking or writing with or upon. The scratching of pictures on sandstone was very much enjoyed. An old piece of slate found in the creek bed was often carefully saved and used in writing in preference to a well sharpened pencil. Colored stones that mark were valued highly and placed in the collection of valuable stones. These stones were used to mark on fences, rocks, or any other place that would receive the marks which were usually the child's own name or initials. Several children wrote their initials on stones and threw them away. This strange desire to write their names in as many places as possible seems to persist through the adolescent years.

Other uses of stones by one or more children were as follows: Six mentioned the use of stones to represent families; father was large stone, mother smaller one and children still smaller ones. Six children played guessing or other games with stones. Some awarded stones as prizes for good conduct; others rolled stones off of a ledge or down a plain; put them in tin cans and rattled them in giving the Indian war dance; fastened a stone to a handle and made a tomahawk; buried stones; used them as jewels; as a throne for a king; as means of representing trees and other plants; arranged them in concentric circles, squares and triangles; used sharp stone to cut down a cherry tree; used stones to scatter along a path so as to tell the way to return; or one would scatter stones and another would try to track her by them; and one little girl placed a stone beside a tree and went to it from day to day to see how fast it would grow.

Collections of Stones

This properly comes under children's collective instinct and as this has already been treated by Mrs. C. F. Burk, it will merely be touched upon here. Mrs. Burk has shown that among the things collected by the 1,200 and more children upon whom she reported, stones were collected by 18% of the boys and 15% of the girls. In the returns which the writer has examined over 50% of the children made stone collections; 175 girls and 46 boys. The chief points of attraction were color, shape, smoothness, brilliancy and beauty. Under shape the attributes mentioned most were smooth, flat, round. Under color, white, pink bright, brilliant, red, dark blue, yellow, sparkling, stained; those with holes in them were also attractive. 144 children collected stones on the account of color, 48 because of odd shapes, 38 because they were pretty, 24 because they were smooth, 10 because they were flat and 12 because

they were round. A few quotations follow: F., at 6. "Collected all the pretty stones I could find, liked round ones." F., at 7. "Picked bright stones and hid them for my own." M.,—"Collected stones and arranged them in concentric circles." M., 10. "Collected Indian arrow heads and other strange stones." M., 8. "Collected stones for beauty or with crystals in them." F., 8. "Collected stones of peculiar shape and color to decorate flower beds." F., 6. "Collected stones which would make marks, especially those which would make red or blue lines." F. "Collected stones after rain; liked smooth, round, black, and white ones." M., at 9. "Had great liking for little stones and pebbles of peculiar shape and color, kept them in pocket or hid them; finally I lost interest in them and threw them away." F. "Collected those with holes in them, put on string and wore as bracelet."

One teacher tells of taking 25 children to the seashore. All, at once, began to collect stones of various colors and shapes. The boys put them in their pockets until they bulged out. In nearly all cases the stones appealed almost exclusively to the sense of sight of the children, as is shown by the expressions used in characterizing the stones selected; such as strange, curious, odd shaped, smooth, flat, bright, pretty, sparkling, brilliant, glittering red, yellow, pink, white, and stained. In a few instances the appeal to the sense of touch was mentioned; as for instance M., "I like to carry a stone in my pocket beceuse I like the feeling of it." Again the appeal to the æsthetic in the child was prominent. The use of the stones as decorations of the playhouses, gardens and flower beds was frequently mentioned; also their use in personal adornment, as in making bracelets. They were also placed away on shelves or kept in boxes where they would be looked at and admired frequently. All this shows the groping of the child's undeveloped instinct for the beautiful.

The use of stones for charms or for luck was also a motive in the collection of stones. 59 girls and 5 boys collected stones with special charms. The supposed influence of the stone would keep them from harm, help gain some desired end, or insure some unlooked for good luck. The lucky stone had some distinguishing mark of color, form or size. In about 20% of the cases the stones were described as either white, or smooth white. Other marks were a white ring or a black ring around the stone, black stone with band of gray about it, stone with letter on it, stone with hole in it, smooth stone, stone with brownish color, or red stone. The specific purpose of carrying or possessing these stones will be better understood by giving a few of the more common quotations: F., at 8. "Wore stone with hole in it around my neck for good luck." F.

"Carried red pebble in pocket for months, believing it would bring good luck." F. "Yellow stones were used as charms or as lucky stones, if we lost one the day we found it bad luck followed." F. "Stone with white ring about it had charm; I buried it, said luck three times, and made a wish." F. "Little white stones had charm to keep off warts from my hands." F., 8. "Smooth brown stone is lucky stone; carried it a certain time and then threw it over left shoulder, not seeing where it went."

These illustrations show how strikingly similar the child's acts are to those of man everywhere in the early stages of civilization. Mrs. Burk has shown that the instinct for collection has a rise, growth and decline. Ellis thinks the collecting instinct a survival of fetichism, which in turn is a form of savage worship. Children are imaginative and have little experience to base their theory of things upon. They see phenomena every day which they can't account for. They feel the wind blow, but they know not "Whence it cometh or whither it goeth." Their curiosity is aroused a thousand times and left unsatisfied. They see forces outside of themselves which they cannot understand. Animism, therefore, is as easy for them as for savage man. Thus their minds afford a rich soil for suggestions of all kinds touching charms, lucky stones, amulets and fetiches concerning which the very atmosphere even to-day is still overcharged. This very suggestiveness and ready imitation may signify a racial instinct and have its roots way back in man's primitive life.

The use of stones for hammers was mentioned by 47 individuals, 25 girls and 22 boys. The chief uses to which these hammers were applied were to crack nuts, to crush things with, to make sparks fly by hammering stones together, to pound things into the ground, and to make noise by knocking stones together in order to call playmates.

Stones were broken, chipped or hammered into powder by 87 children. They liked to crumble soft stones to make powder for mud or medicine or to mix with water and make paint. Stones were chipped to see what was inside, especially to see where crystal, mica, quartz or color came from; or were broken for decorations. Again others said they liked to break stones but they could n't tell why. Some of the more common expressions given were: M. "Pounded up soft stone to make mud." M., 8. "Sandstone was ground up for medicine or sugar; also broke stone with mica in it to get it out." F. "Gathered different colored stones, pounded them into powder and put into bottle in layers." F. "Liked to break and chip stones and pound them into powder, mix with water and mould into little balls and dry in the sun." F., 7. "Liked to crack stones to see

what was in them." F., 8. "Broke stones and chipped them, liked the smell, it was a powdery smell." F., 6. "Broke prettiest with hatchet to see where color came from, also tried to break flint to see where fire came from." F. "I liked to strike stones to see sparks fly." 18 children set stones on edge. The following quotations will show why. M, 2. "Stands rocks on edge and screams with delight." M., 7. "Stands stones on edge for wall." M., 5. "Stands stones on edge and knocks them down as enemies." These are typical.

Stones have played a large part in the story of human evolution. Perhaps more than will ever actually be understood and appreciated; and indeed more than had been thought to be the case until archæologists in recent years began to dig up, classify and study the products of the first steps of civilization. These investigations are revealing a richness of material that bids fair to unlock many of the mysteries of man's early advance in his conquest of, and triumph over, his environment. They show that stones of various kinds were the one great means by which man succeeded in making an advance over his four-footed brethren. Rude implements and tools of all kinds show that the first evidences we have of past history reveal a state of civilization already pretty complex. The ages that elapsed before man was able to modify stones and adapt them to his use, as shown by archæological excavations, must have been of great length. Of course these must always be a closed book except in so far as their nature is revealed by various tribes of to-day occupying the same stage of civilization. Yet this age, of which there is absolutely no vestige of record remaining, was the real beginning of man's upward movement. Here man began as the only tool using animal and this was what helped him in his contest for supremacy with man and beast. These earliest tools were stones. Perhaps he first found a sharp stone and used it and ultimately tried to improve it; and so came the great number of primitive tools such as chisels, arrow heads, scrapers, saws, hammers, etc. Thus was begun the stone age in the dark and distant past. Stones were the weapons of offense and defence; the fierce struggles that were waged against man and beast were won by the use of superior implements of warfare made of stone. Those who could make the sharpest instruments and could use them most skillfully survived. In short their whole life was centred around stones, and progress was made possible by their use.

In historic times stones played a large part especially in the early life of the people of Europe and Asia. Among the Hebrews the stones were regarded as instruments of death. Precious stones were often mentioned as symbols of divine glory. The ceremonial use of stone and flint has been prominent in

all ages. As an appeal to the sense of beauty stones have had a great effect throughout history and even to-day man's most precious ornament is a stone. Since stones have played such an important part in man's evolution it is not strange that they should make a strong appeal to children and enter so prominently into their play. It is another illustration of the psychic adaptation of the race to its environment in its evolutional struggle. It seems but wise to use and direct this interest and give it full and free play. The child may thus become acquainted with the facts that will later help him interpret the composition of the earth's surface; but what is better he will be stimulated through this activity to healthful, physical and mental life. In building with them he will need to plan and think and then execute. Even if the stones are rough, and he bruises his hands a little now and then, this will not be amiss in his contact with the larger life that awaits him. Similarly all other activities of children in connection with stones mentioned above are healthful and might well be encouraged.

Snow

Snow has ever been the delight of childhood. The dreariness of the late autumn months is made more endurable because of its prophecy of the cover of whiteness that will soon spread over the landscape and hide the dreariness from view. And then a thrill of delight fills the youthful heart as the first flakes begin to fall, "And driving o'er the fields seem nowhere to alight." No more study and work now until the pent up enthusiasm is spent in happy glee and play out in the midst of the "Swarm and whirl dance of the blinding storm as zigzag wavering to and fro crossed and recrossed the winged snow." Then the wading through the drifts, the digging through the "solid whiteness;" and finally when the warm south winds change the dry, light snow into the moist, plastic moulding material, the snowballing, the making of human forms and the playing of games—all add to make snow truly a joy of childhood. Especially on days when snow is falling are children stimulated to a higher pitch of activity and enthusiasm. They become more spontaneous and unrestrained in their play. There is new vigor and life pulsating throughout their bodies and they abandon themselves to the impulses of the moment more than at other times. This is shown by the following quotations:

F., 20. "I was always happy when I saw it begin snowing and when I could run and play in the snow."

F., 19. "We children used to love to jump into the deep snow from a wall. We would bury each other in the snow with laughter and shouting."

F., 22. "I liked to play in snow. I helped my brother dig

caves in big drifts, packed snow together for forts and made hills, working for hours for one or two slides down it later."

F., 20. "Whenever it snowed we built a fort and had a snow fight. I remember doing this from the time I was six. We made men and animals and played circus."

F., 20. "Threw snow by the handful into people's faces and tried to wash them. Made snow men and then run and jumped on top of them and tumbled them down."

This overflow of life is probably due to the brightness of the snow. In the article on "Reactions to Light and Darkness," by Drs. Hall and Smith, it has been found that there is a close connection between the general feeling tone and the amount of direct sunlight. The bright effect of the white snow no doubt has a tendency similar to direct sunlight.

The returns covered 411 observations of children, and reminiscences. Of this total number 159 were boys and 252 were girls. These children were somewhat older than those playing with blocks, ranging from 6 to 12 years of age, and worked more in groups than in playing with blocks. There was a marked tendency to make constructions and mould forms of various kinds. Under certain conditions snow is especially adapted to this use. It packs easily under pressure, and yet it can be changed in form with little effort. With the child's instinct for constructing things it is not strange, therefore, that snow should be made use of for this purpose.

Nowhere, perhaps, do we have a better opportunity to study the child's crude imagination and primitive constructive power than in the snow constructions. This is especially true with regard to his efforts to mould the human form into the so-called snow man that is so frequently made. Of the total number of children reported 319, or more than 75%, attempted the construction of snow men. Like primitive man, the child is easily satisfied with his product, be it ever so rude and imperfect. The snow men were more or less alike. They usually consisted of three balls of varying dimensions piled one above the other and shaped where they joined. The lowest ball was always much the largest with the smallest on top forming the head. The height of the whole was determined by the age and height of the children. The tendency was to make the figure as high as they could reach. The arms were frequently omitted, and not very successfully done when attempted, and the fingers were not indicated. The parts of the body that received most attention were the face and the upper part of the trunk; but nearly all the effort was centred upon the face, as will be shown by the following typical quotation: M. and others. "Made snow man by rolling three balls. Punched holes for eyes, nose and mouth."

M. and F. "Made snow man; used bits of coal for eyes, stones for nose and mouth, and broom for musket."

F., 5. "Made snow man by rolling snow balls and placing one on top of the other; used coal for eyes, nose and mouth and row of buttons down in front."

M. and F. "Made snow man; used stones for eyes, used stick for nose, drew ears and mouth with pointed stick, placed clay pipe in his mouth and hat on his head."

M. and F. "Made a snow man by rolling long balls for arms and legs, used coal for eyes and small ball of snow for nose, also for ears, made long line for mouth, put a stick in it for a pipe, laid stick on shoulder for gun."

M. and F., 10. "Made snow man with marbles for eyes, hay for whiskers, excelsior for hair, and a piece of red flannel cloth for a mouth." The eyes received more attention than any of the other features. While all of the children did not go into details concerning their snow men, 52 mentioned the eyes especially and made great effort to represent them with effect. The usual representations of the eyes were stones, marbles, pieces of coal and short sticks. The mouth seems to have been second in the attention it received; it was mentioned 50 times and was usually made of sticks or just a mark in the snow or a row of cranberries or red cloth. The nose was mentioned less frequently and the ears a very few times only. It may be due to the fact that the ears are less easily represented. Very few attempts were made to represent the legs of the snow men and in all cases these were made by the older children from 10 years up. The younger children were satisfied with a large ball as a foundation upon which to construct the remainder of the form. It would thus seem that they centred their attention upon a few of the more important portions of the human form to the neglect of the others. Only three attempts were made to make snow women. One of these, a girl of 7, rolled large balls of snow and made a woman by shaping the bottom ball like a skirt and made her with her arms crossed, which must have embodied her idea of woman's characteristic position. It is not clear why they gave so little attention to the making of feminine forms.

Perhaps it was due to the fact that the boys took the initiative in the constructions. There is some evidence of this as the girls frequently stated that they helped their brothers. But the more probable reason is that man's more active, out of door life appeals more strongly to the children's imaginations.

The attention to the dress of the forms made reveals the crude conceptions which children have concerning the representation of clothing. Thirty-six children represented the

coat with a row of pieces of coal down the front for buttons. Six placed a hat on the head with no other effort to represent clothing while the rest made no effort whatever to indicate clothing. There was considerable effort to put content into the forms and express ideas with them. Father and son were represented by tall and short forms. Some children made whole families—the father, mother and children; put a pipe in the father's mouth to distinguish him, and a broom into the mother's hand to distinguish her while the children were made smaller and of different sizes. Soldiers were indicated by placing long sticks on their shoulders for muskets. They were usually stationed near a fort to guard it. Various characters such as old King Cole, Santa Claus, and others were given some distinguishing mark.

The tendency to make caricatures was noticeable. Some were dressed up like scarecrows, others had long sticks in their mouths for cigars or pipes, and again others had old hats and in one case a dented derby in such a way that it expressed their sense of the ludicrous. Several different attitudes were manifested toward these creations of their imagination. Some called it their teacher and snowballed it. Others fixed it all up with hat, broom, pipe in mouth, and then were afraid of it at night. Again others used the snow figure as a target and shouted with delight when the nose, arm or head was knocked off. One boy is quoted as saying that he was sorry when it melted and left nothing but a puddle of water.

Some of the children made their own forms in the snow by lying down flat and placing their arms out straight. They took great delight in seeing their own forms in this way, as the following quotations will show: F., 8. "Made a picture of myself by lying backwards in the snow." M., 8, lay down in snow to make his print in snow. This effort to see their own form probably arises from a desire to get better acquainted with themselves. Angels were also made by lying in the snow and moving arms and hands up and down in the snow to make wings. Whole rows of these were made side by side. Others made like figures and called them butterflies. Again others made forms of cats, dogs, bears, lions, tigers; drew pictures with stick, and wrote names.

The data do not permit an accurate treatment of the ages of these children but the extreme limits are pretty clearly marked. Of those children whose ages were indicated none were below 5 and none above 13 who participated in making snow men. Of the 82 whose ages were given 6 were 5 years old, 12 were 6 years old, 16 were 7 years of age, 14 were 8, 7 were 9 years old, 12 10 years, 7 were 11 years, 8 were 12 years. It would have been a very interesting thing if the data had been given

to study the development of this tendency to make human forms and its decline. The fact that none of these children whose ages were given continued the making of snow men beyond their 13th year would seem to indicate that this must be near the decline of this form of expression. Indeed it is not surprising that this should be the time when they lose interest in this form of self expression since this is the period of change to larger life and interests. Reason is also more fully developed and children live less in the imagination. This is also the beginning of the awkward age when children have less confidence in themselves and more hesitation in expressing themselves in any form. They are more able to judge between what they actually do and what they attempt in way of self expression.

As has been stated before we have here a photograph of the children's minds such as can be gotten in few other ways. The pedagogical hints and suggestions to be derived from this study touch some of the most vital questions in education to-day. The satisfaction which the child gets from these crude expressions of his ideas emphasizes the fact that he has a craving to express himself, and he should be encouraged to do so. But he must not be required to be too minutely exact and painstaking in his work. The rough outlines satisfy him and are the best his stage will allow him to use.

The general character of the forms made by the children indicates that their early efforts embody types and not copies of real objects or forms. The type does not lead to careful attention to details and so more attention can be given to the main outlines. This needs to be considered in asking young children to draw.

Among primitive people everywhere this expression of types is attempted and the representations have a marked resemblance to those of children.

There is good reason for believing that the child's interest in this form of expression rests upon a strong phyletic background. The earliest records of mankind show that even at that time man had developed a relatively adequate way of representing human and other forms.

The other constructions of snow were numerous and varied, principally forts, houses, caves and large balls. The forts were mainly built of large snow balls piled on top of each other with snow piled up around them. Sometimes they were closed on three sides but more often simply a long, large pile of snow was made for protection in the snow fights. Some made large mounds and dug out the inside and made small windows through which they could watch the enemy. Ninety boys and 79 girls were reported as participating in the construction of

these forts. Besides these many papers mentioned groups of children engaged in these plays. In fact all play of this kind is done by groups of children. The group is the unit in the construction of the forts and in carrying on the contests. The children divide themselves into two groups and each builds a fort and then each tries to destroy that of the other, or to drive them away from it. Sometimes flags are placed on the forts and then the contest is directed toward capturing the flag. There were 67 different descriptions of, and allusions to, these group snow fights. Sometimes there was a captain on each side and definite rules controlling the battle. Sometimes forts were used to hide behind and throw at passers by; again there were a number of descriptions of snowball battles between two individuals at close range and with great vigor. The throwing of snowballs at marks, and without purpose was also often mentioned.

These snow battles and the impulse to throw balls at each other and at passers by indicates a ripeness of the muscles involved in throwing, which are especially the muscles of the shoulder and the upper arm. These snowballs are admirably adapted to give expression to this tendency. They are more or less harmless and yet form excellent missiles. They are sufficiently effective to enable the one or the other of the contestants to triumph by virtue of superior skill and strength and yet not severe enough to do permanent harm. The vigor with which these contests are carried on and their spontaneous nature leave no doubt that they satisfy a deep-seated craving and interest, and are echoes of an age when skill in throwing meant survival. This will be referred to in another connection.

It would be interesting here to see how this tendency on the part of the children is met by the schools. In a number of schools with which the writer is acquainted there is absolute prohibition in the matter of throwing snow balls, or engaging in snow fights of any kind. He has very distinct recollections of one school of 300 pupils in which such a rule was inforced. The falling of snow always brought its troubles, and frequently after the school intermissions the halls of the building reverberated with the reminders that were being applied to the effect that the wicked urchins should not again give expression to this phyletic tendency. Perhaps rightly, too, for the limited area of the playground and the proximity of dwelling houses all around made it rather dangerous to allow the free throwing of snowballs. But this lack of school ground only goes to show that school officials still have the idea that schools exist for the sake of book learning and that the physical part of the child is of secondary importance. The idea that the child must first have a good strong body and that the school should work towards this end has yet not taken firm root.

The snow houses, caves and tunnels were more or less elaborate; 106 descriptions of houses were given and 84 of caves and tunnels. The houses were built by piling up snow and packing it down, digging out the centre of snowdrifts, or by rolling large balls and piling them up. A few quotations follow: M., 10. "Built snow house and put cat in it and closed door for ten minutes." M., 8. "Built snow house which held 5 boys." 4 M's. "Built house by first piling up snow then dug passage through it and then dug out inside; poured water over it to freeze it." M., 4; F., 8. "Built house by digging in deep snow bank, then filled entrance except door, then took carpet, stool and table in and ate inside." M., 9. "Built snow house against fence, could crawl in at one door and out at other; this was pleasant." F. "Built house by digging out room and putting chairs inside, had party inside; did not mind cold for we bundled up." M., 5 and F., 9. "Built snow up 4 feet high, patted it down with shovel dug out inside, sat in it with candle and ate like Eskimos." One thing that interested the children much was to make long tunnels into a snow bank and then dig out a large space in the interior of the bank and crawl back and forth. The opening into the interior must be small so as to be just large enough to crawl in and out. This gave special satisfaction as was also noticed with the cave houses.

One hundred and twenty children liked to roll large balls. A variety of reasons was given for this; some wanted to see how large they could make them, to see how long it would take them to melt, to see who could make the biggest, to roll them down hill, or just because they liked to make them.

It may seem strange to speak of snow as a factor in education and yet the opportunities here are simply unlimited in the northern states where there is a liberal supply. For purposes of construction and moulding there is no better material and it is evident that children enjoy this. If instead of prohibiting the play in snow, as is now so frequently done, children were encouraged to play with it and to construct objects, roll balls, mould figures and have snowball contests, it could be made a valuable help in education.

Strings

What part do strings play in the early life of children? What string games and plays interest them? Perhaps few persons fully appreciate the large and varied use which children make of them. Of the five hundred children reported upon, not one was there who did not have some interest in strings. The infant of two or three soon learns to tie chairs together, to pull objects attached to strings, or to play horse with strings for lines and harness. At this age the string is

also used to collect buttons and beads, which are used for decorative purposes and fastened to the hair, or worn around the neck, or wrist. As the child grows older these uses are extended in many ways. The material used varies from the common cord to willow bark, corn husks, grasses, leather strings, and rope.

A differentiation in the use of strings soon becomes evident between boys and girls. Although a great many uses are common to both and what one does the other imitates, yet by the time they reach the 9th or 10th year the different interests are pretty clearly marked. Some of the uses common to both are making cat's cradle, see-saw, playing horse, tying strings together, pulling objects with strings, making. telephones of strings and cans, and making animal forms. Both boys and girls braid but with different ends in view. The most common mode of weaving is done with the use of a spool and four pins or tacks placed at one end of the spool to which four strings are attached. The strings are then braided or woven with the use of some sort of needle. The most common modes of braiding are also practiced with from three to seven strands. Grass, hay, willow bark, corn husks and silks are used in braiding, besides the common cord. The most frequent use of the braided material is that of lines for playing horse. The girls very frequently use the braids to make circular or other shaped mats. They also braid rags and make rugs of them. Hay, grass, clover stems, or varied colored strings are braided and from these are made necklaces, watch chains, bracelets, or rings; corn husks and silks are braided and used for doll's hair. The boys use the braided cord, grass, straw, leather, or willow bark, for harness, whips, fish nets, swings, to make bows or as belts for machines. Boys have a greater interest in saving string and when they find a cord of any kind it usually finds its way into their pockets. Both boys and girls are interested in knots of various kinds; but here again their interest is different. Boys want to learn to tie hard knots and knots that others cannot undo, such as puzzle knots, sailor knots, slip knots, twists and hitches. Girls, on the other hand, are more interested in knots for decorative purposes. They like to tie many knots or loops of various kinds in a string and hang it about their dress, or they may even have knots take the place of beads around their neck, etc.; or they may knot a hammock for their dolls.

Some of the applications of strings which belong more distinctly to boys are making bows to shoot, sling shots, flying kites, making fish nets, rigging up machinery with strings for belts, devising new puzzles and tricks of various kinds, rolling

strings into balls, and making harness for dogs or goats. The tricks with strings, such as working out puzzles; cutting a double string and apparently chewing the ends together; or tying a string to a button-hole and taking it off without untying it, have a great charm for the boys.

Crocheting, working with the needle, and making ornamental articles such as bows or loops, appeal more especially to girls, according to the returns, as is illustrated by the following:

F. at 11, had fancy for tying bows; fixed odd bows, on back of chair, in my hair, around my waist, and for my dolls.

F., 8, decorated her doll's hats with ribbons, sashes and ties.

F.,—, made rope dresses, decorated myself with rope in which were tied knots and loops.

F., 7, braided colored string into bracelets, necklaces, and rings.

At about 6 or 7 the girls use strings to sew dolls' clothes and make play clothes for themselves. Later, at about 10 or 11, the use of the needle appeals strongly to them. The various stitches, such as the cross-stitch, hemstitch, brier-stitch, feather-stitch, knot-stich, backward stitch, cat-stitch, crow-stitch and button-hole stitch, are learned and new ones invented. Crocheting is also learned with enthusiasm and new patterns are puzzled out and named. Laces of various patterns are made and new ones attempted. This interest in the various lines of crocheting and needlework may grow and continue through life.

There is perhaps no spontaneous interest on the part of the child that is more marked and definite than this string interest. It has not been adequately recognized and made use of in the child's education. Nothing which the child could do would give it a better idea of man's early difficulties in overcoming his environment than this free use of the string. It could also be made an excellent means of introducing the child to many phases of the great modern industrial world. The extended application of the principle of the string underlies much of the progress of civilization. What would be left of our industries or even of our civilization if all applications of the string were never invented? Not only would all textile industries disappear but also all such machinery in which belts and chains are used. The early steps in civilization seem to have depended as much upon its use as those of later times. One need only visit an anthropological museum, such as the Peabody Museum in connection with Harvard University, to be convinced of the great part played by the string in the early struggles of the races. The great degree of perfection of many of these uses of the string found

among primitive people indicates that its use came very early in the evolution of man. "The textile art is older than the human species. For not only spiders and many caterpillars draw out extremely fine threads, but birds wove nests long before the advent of man on earth. . . . . There is no reason to doubt that the very first women were weavers of a crude kind, and that textile art has been with us always in one form or another." (The Origin of Invention, O. T. Mason, p. 224, chap. VII.)

Most primitive people use the string in connection with religious rites, ceremonies and magic. Many of our common string games are hoary with age, and were perhaps once connected with magic performances, of various kinds. For example, our common game of cat's cradle is made in some form or other by nearly every primitive tribe of the world to-day; and is also known by most civilized people. It has been found among the people in the following countries: Korea, Japan, East Indian Archipelago, Australia, Africa, western Asia, and among the Eskimo, American Indians in both North and South America, and the people of western Europe. There are 97 varieties of this game known to the world. Some are accompanied by muttering chants or songs. In other cases a consecutive story follows each movement. The same history might probably be worked out for each of our common string games and tricks. "All over the world strings, cords, and knots enter largely into the magical practices." (A. C. Hadden, Introduction to String Figures, p. XXIII.) The fact that primitive people make so much use of the string in all phases of their daily lives, including their religion and magic, gives some idea of the large part which it must have played in their struggles and how much they valued it. It undoubtedly became of survival value to many primitive tribes.

The analogy between children's uses of strings and those of primitive man is thus seen to be very close. Undoubtedly many of the uses which children make of them to-day are given us by social inheritance as is generally maintained. But the aptitude which children show in their use and the intense interest with which they play with them, and even save them, point to something more than mere imitation. It has been said that the younger the child is the racially older it is. If this be true it can readily be conceived how the early struggles of the race with the string as a means of evolution, could give to the modern child's mind a psychic stringward tendency. From this point of view it becomes all the more necessary to utilize this racial instinct in the early education of the child.

Points and Edges

The first fact which the returns reveal is that girls are much less instructed in the point and edge as a means of sticking and cutting than the boys. Of the 384 children reported upon, almost three-fourth are boys. The knife leads in interest, nearly every boy being keenly anxious to own a knife of some description. If unable to own one he gets much satisfaction in using some one elses. The interest begins to manifest itself at about 5 years, and grows to about from 12 or 15, when it is at its height. Considerable sacrifice is sometimes made by the boys in order to purchase a knife. Several instances were given in which boys worked for several days for a knife or deprived themselves of other things to buy one. Some spent all their money for knives owning as high as five or six at one time. Their interest centres in the number and sharpness of the blades. Each boy's knife must be sharper than those of others, and comparison of knives with respect to sharpness is common. The blades are tested by cutting into hard material, by seeing which can cut the largest shavings or chips from wood, or by trying to cut paper or a hair. This leads to sharpening the blades and all sorts of efforts are made to improve this quality. The grindstone and whetstone are freely used.

Boys not only like to have sharp knives but they want to use them. They whittle sticks, boards, fences, palings, boxes; they cut into furniture, desks, chairs; they carve their initials upon everything which will receive them, including desks, buildings, fences, trees, walls, stones and cliffs. Pencils are sharpened often and to fine points, even when not especially dull. They also carve objects out of wood, such as canes, chairs, whistles, boats, boxes; cut out baskets and other toys from English walnuts or peach seeds. They throw their knives with open blade so that it will stick in trees, boards, or the ground. They play mumbly-peg. They often make motions with open knife in hand, brandishing it as if to stab some one. They sharpen sticks and call them daggers, or whittle out swords with which they have Indian fights, or cut down tall weeds as enemies. Stiff weeds are cut, sharpened at one end and hurled endwise at objects. Great skill is sometimes acquired in this way and the consummation of a boy's ambition is to be able to hurl one of these instruments through a pumpkin or watermelon. The sword, spear and dagger appeal strongly to the imagination of the boys. They fasten these to their belts and play robber, or soldier, and sometimes impersonate great characters like Washington, or an Indian chief, and kill imaginary enemies or charge upon wild beasts

such as mullen stalks, stumps, grape vines, and bushes. One boy of eleven carried an old butcher-knife with him and made a spear by fastening a machine guard on the end of a broom handle, and a tomahawk by fastening a machine section on the end of a stick. Another had a sharp-pointed wire for defense, and a tin sword, which he loved to carry. These weapons are carried about or hung up in their rooms as decorations. Old swords are especially prized for this purpose, and are placed in conspicous places. The bow and arrow are made and used with some degree of skill. The arrows are sometimes tipped with some metal point, as a nail sharpened to a fine point. These are shot at marks and sometimes at cattle, hogs, dogs and cats. Another practice which seems to give the boys an unusual degree of pleasure is to put a pin in the toe end of their shoes and prick their companions, or the cat or dog, with considerable degree of force. Sharp tools, such as the hatchet, ax, saw and chisel, are used with no definite purpose but with interest. Sharp sticks and sharp stones make a strong appeal to children, and many instances are given of collections being made of these. Sharp stones especially are picked up and saved or used for cutting or scratching, or they are thrown at a board and the effects examined. Several cases were given that might be considered as verging on the abnormal. One girl could n't look at a sharp dagger without wanting to use it on some one. Another case was that of a boy who had a mania for pricking other boys until he drew blood. The report states that he gave much trouble. One boy of 6 sharpened a stick and speared bugs and worms.

Girls are interested in the use of the scissors and love to cut designs of paper, or cut out paper dolls, or fringes in cloth or paper. Some use a sharp stick for a pencil to write their names in dirt and snow, or draw figures or forms. They also use the knife to whittle and cut their initials on trees, fences, or other places which will receive them.

The analogy between these activities of children and those of primitive man is very close. The point and edge were both tremendous factors in man's early evolution. Among nearly all primitive tribes on earth to-day the point and the edge are developed to a high degree of perfection. We must assume that there was a time when neither of these existed in any form. There must then have come a time when primitive man learned the effect of bringing his whole strength to bear upon a single point. This secret, whenever and however it was discovered, gave the favored tribe great advantage both in their quest for food and in offense and defense. Close upon this must have developed the use of the edge in some form or other; or perhaps it came before the point. At least it does

not seem illogical to associate them somewhat closely in their origin. With these weapons the tribe would be almost invincible and the cultivation of their use would become a matter of greatest moment. All through man's history they have played an ever increasing rôle. In the complex world of today with its myriads of inventions it is perhaps difficult to imagine that the point or the sharp edge should at one time have been the great means of survival. And yet this in all probability was the case. From this point of view it is not unlikely that those members of the tribe survived who had most skill in the use of these instruments; and that those tribes survived who were favored by these skillful individuals. In short, the use of these instruments led to somatic and psychic modifications of the race. In the story of psychic evolution some such sequence of events must have taken place, and from the point of view of the child it offers the only satisfactory explanation of this unusual interest in the instruments of this character.

The strange phobia of sharp objects with which the insane are sometimes afflicted would hint a similar origin. What in normal minds appears only as an interest is here magnified to great proportions and causes the phobia.

Whatever may be thought of the origin of this interest on the part of children in the point and edge, its use as a means of education cannot be ignored. Here again we must move with the current of the children's natural bent and allow this to decide what should be done. This factor is too often neglected in planning manual training work and other exercises for children.

Modification of Bodily Form

The facts brought out by the returns on the subject of modification of bodily form by children indicate that this is attempted to a very marked extent. Of the 245 girls and 126 boys reported upon, practically all tried to change in some way their features, or stature; or they tried to use their dress to add in some way to their effect on others. This is very largely due to a growing consciousness of self. The child very early becomes acquainted with the different parts of his head and body, but not until several years later does the sense of self assume a critical attitude. The child of two or three knows that he has a nose, eyes, mouth, ears and hair but he does not find fault with them. But at six or seven, and especially a few years later, he begins to examine his features and dress in the light of his more critical observation of the features or dress of others; or of what he has heard others consider attractive. The features and dress of persons whom the children admire

become standards with which their own are compared. There seems to be much more of a tendency on the part of girls to do this than on the part of boys.

The nose is one of the features frequently referred to and is subject to great criticism. There is, however, no definite standard of shape or size. Some think their nose too broad and pinch it constantly to reduce its width. They even put clothespins on it at night and try to sleep with the nose in this position. Others put clothespins on the nose to make it pointed. Again others want a pug nose and hold it in that position for long periods at a time. A few quotations will, perhaps, help show their attitude:

F., 20. At ten I pulled my nose so it would be pointed like my aunt's.

F., at 9. I pushed up my nose to make it shaped like a girl's I admired.

F. Pinched my nose so it would be like my teacher's.

F. Slept on my nose to keep it from being hook billed.

F. Nose turned up, wanted it to turn down. Thought of cutting off end, it was too long.

Dimples are another element of beauty, the absence of which is lamented. Several rather strenuous efforts to secure these were reported. One girl stood before the mirror for hours and pressed her fingers into her cheeks in the hope that dimples would remain. Another put clasps, which her brother used on his trousers when riding a wheel, on her cheeks. Still another made faces before the mirror to induce them to appear.

The ears also receive their share of attention. The majority of those who mentioned their ears wanted them pierced so as to wear rings in them. Some begged to have this done; others tried to do it themselves. One group of girls retired to a secret place to attempt this but their courage failed. All sorts of substitutes are made for ear rings, such as fastening strings with something attached to their ears or sticking maple seeds on their ears. One girl of 13 pulled the lobes of her ears so they would become longer. Although boys do not pay much attention to the shape of nose they are somewhat concerned about their ears. One boy of 11 wore nightcap to train his ears back; another of 12 tied a towel around his head to keep his ears from growing too large.

The eyebrows and eyelashes are considerably mutilated and for various reasons. Some children pull them out entirely, or burn them off to see how they will look without them. This is especially true with boys. Others do so to wish with them. Sometimes they are trimmed in the hope that they will grow, or because they seem too long. They are also colored or pencilled, one girl of ten putting shinola on hers.

The hair is perhaps subject to modification more than any of the other parts of the head. The scissors are freely used by both boys and girls, and they cut their own hair even at four or five years of age. They cut their curls off because they are tired of them, to see how they will look, to improve their looks, and one little girl cut hers off thinking she would then be a boy. A number of girls wanted curly hair and resorted to many means of accomplishing this, such as soaking it in buttermilk or sour milk, putting mucilage in it, or fastening shavings in it. The color of the hair also causes some anxiety and attempts are made to change its color. One girl of 10 who had red hair and freckles exhausted all her remedies in trying to change the one and remove the other. The manner of wearing the hair is also considered of some importance among children, especially girls. Some braid long ribbons into their hair to make it look longer; others put it up on top of their heads to look taller and older. One girl of 9 took great pleasure in wearing her hair in various ways, changing it frequently.

The complexion of the face is changed in many ways. Girls from 8 to 14 paint their face to improve their appearance, and give especial attention to the cheeks and lips, and use starch, water colors, young oak leaves, mullen, snow, candy and pink chalk. The mullen and snow are used to rub the cheeks briskly. Boys also color their faces, but usually for purposes of disguising themselves; or to play Indian, or impersonate some character. Girls also color their faces for purposes of impersonation. They not only color their faces but dress up in all sorts of ways. The dramatic instinct is strong and expresses itself in many ways, as will be noticed by the following quotations:

F., 9, dressed like my grown sister, powdered face.

F., 8, dressed up, using long skirt, high hat, put hair on top of head with ribbons.

M., 11, dressed in Indian costume, hat-band with feathers, belt with daggers, cheeks painted red, black lines under eyes and on forehead.

M., 10, blackened face and put old clothes on to scare sister.

There is also a marked tendency on the part of both boys and girls to impress initials, pictures, or marks of various kinds upon their hands, arms and face. An indelible pencil may be used or tattooing may be done with pin and ink. Pictures are transferred to the arms or hands and care is taken that these pictures, marks, or initials are not washed off for a long time. They are marks of distinction, and great pride is taken in showing them. This is especially true of boys who

have figures, stars, or anchors, tattooed on their arms. The finger nails are painted, pointed and notched in peculiar ways, and a favored nail may be allowed to grow long and be protected with considerable care. The girls are sometimes solicitous about the size of their hands and the shape of their fingers, and they are squeezed to make them small and of proper shape. This attitude is sometimes taken towards their whole body. One girl lamented her small stature and asked to be lifted by the head, while another sat much because she thought it would prevent her from growing tall.

It seems hardly necessary here to mention the analogy between these activities on the part of children and those of primitive man. There is perhaps not a single trait here mentioned that could not also be found among savages. The awakening of the sense of self in primitive man through long ages, is probably duplicated in a somewhat telescopic fashion by each child.

The one thing which such a study as this reveals is that children have their own point of view, many times radically different from that of the adult. One must first try to understand children and get their point of view if one is to treat them sympathetically and be helpful to them. Pedagogy sins more just at this point than perhaps in any other way. Many a parent may love his child and want to do all that is necessary for its welfare and yet utterly fail because of this inability to see things from the point of view of the child's psychic evolution. The same might be said of teachers.

Attitude Towards Clothing

From the returns, one must conclude that Whittier's "Barefoot boy with cheek of tan," tells only half the story, and that the barefoot girl with cheeks of tan is also to be found. Of the 350 children reported upon almost two-thirds were girls, and there was not any less enthusiasm among them for going barefoot than among the boys. From about four or five to 12, and even later, the desire to go barefoot seems to be universal among both boys and girls, although they are not all allowed to do so. This feeling is strongest in the spring when the days begin to turn warm, and just after a rain. The first hint of warm weather seems to awaken the desire to go barefoot, and in many cases parents can scarcely induce their children to wait until the days are warm enough. One boy of 12 wants to go barefoot in spring as soon as frogs croak. All sort of excuses are made by the children to accomplish this end. Some go away from home and indulge in this for a few minutes when parents do not know it. Others take off their stockings and put their shoes back on. Those children who

live in the city and are not allowed to go barefoot but who have relatives in the country, where they are permitted to do so, regard this as of sufficient reason to visit these relatives in the spring and summer. A number of teachers reported that in the spring when the days begin to be warm, every child in school would often be found with his or her shoes off at noon, and would run about in greatest glee. Several reports were given of boys taking off their shoes in winter and running about in snow for a short time. The desire to run about in the mud and wet grass with bare feet becomes very acute after a hard rain. Children say that the mud feels so pleasant, and the cool, wet grass makes their feet feel comfortable. Boys like to go bathing, or swimming as they call it, and run about on the sand in their bare feet. Others like to strip off clothing and run about in the rain. Small children seem to take special delight in running about after their bath.

The desire to go without a hat or bonnet seems to be almost as strong as the desire to go barefoot. Many cases were reported of both boys and girls going bareheaded all summer and until late in the autumn. Even when parents were solicitous about their complexion and tried to induce them to wear sunbonnets they refused to do so. F., up to 9, resented sunbonnet which mother tried to compel her to wear. M., 7, quarreled with his mother for weeks because she tried to induce him to wear a sunbonnet or large hat. He preferred to go bareheaded. F., 6, M., 8, never wear hats. These citations could be indefinitely extended.

This attitude on the part of children is strikingly analogous to that of primitive man; and it is difficult to explain on any other ground than that of atavism. It seems to be another evidence of recapitulation on the part of the child.

Striking

The striking propensity of children from infancy up to the age of 12 to 14 is so universal that it has impressed itself upon all who have even casually observed children. It has often been termed the age of striking and all through child literature appeal is made to it. The pounding of the small child upon the plate, table, chair or floor is proverbial. A boy with stick for sword and a mullen stock or flock of geese as enemy we have come to associate together. It would have been strange, therefore, if the returns had not borne out this idea that is so common concerning children. Ninety per cent. of the answers to the question concerning this phase of child activity confirmed the above prevailing notion. The infant is handed a spoon or toy and at once it begins to swing it about. The grasp is firm and can easily hold the object; finally it strikes

the table or plate; this is repeated over and over until the association is formed and then the striking becomes continuous for long periods at a time. Numbers of instances were given of this continued repetition of one act. The returns indicate that this begins not later than the sixth month. This striking by infants of table, chair, plates and the floor with toys, spoons, knives, forks, blocks was mentioned in practically all the returns. Soon the stick comes into use. Those who suffer most from this are toys, the cat, the dog, other children and adults. This tendency increases, especially with boys, from 5 to 10. Whips are made from straps and sticks or are cut from bushes and carried by the boys who constantly strike at everything that comes within reach as the following quotations will show: M., 7, carried club, stick, or cane for gun. Loved to play school and be teacher so he could whip. M., 7, struck trees and fences as "Jack the Giant Killer." Played policeman and carried club. Boys of 8 lined up with sticks and then charged upon weeds and bushes. M., 9, liked to play horse with whip and use it. Liked to hit weeds, stalks and stems. Boys of 9 struck cat, dog, trees and house with stick. M., 8, hit himself with whip as horse. M., 10, likes to cut tops of grass off with stick. Similar statements were repeated over and over in the returns. Many of the boys and girls say they carry a stick because they feel safer when walking along the street or road. In walking along with a stick it may be used to strike at weeds, animals or even people. It is also dragged along a picket fence so as to make a rhythmic noise. In riding in a vehicle one great pleasure is to use the whip on the horses. Boys and even girls engage in whipping contests, in which two of them with whip in hand beat each other until one or the other gives up. Driving stock also gives great pleasure because the whip can be freely used. Much damage is sometimes done in striking flowers, small trees and other plants of value. There seems to be an almost blind impulse to perform this motion with something in the hand in the shape of a stick or whip.

From the use of the stick and whip the child in the course of time learns the use of the lever. This usually does not occur until the tenth or twelfth year. There is considerable variation here. It is interesting that many children do discover this incidentally in their play with the stick.

Throwing probably develops in the child from striking. In his effort to strike, the object in his hand may slip from his grasp and fall to the floor. In the course of several repetitions of this the child learns to drop things on the floor and from this develops the idea of throwing. The motion is at first awkward and is little more than an aimless motion of the

arm and hand even up to the third or fourth year. Progress is slow; but gradually through constant practice and continued repetition such as only a child can engage in, the arm and shoulder muscles come under control and the act of throwing becomes more definite and purposeful. This instinct to throw grows with the child. The returns show that from about the first year up to the 12th year the interest grows and is at its height at about 13, although in some cases it goes beyond that. There was unanimous testimony on this propensity of the child for throwing. First girls and boys both throw with almost equal interest but in girls it begins to decline very soon. Small children throw everything they can get hold of: blocks, toys, spoons, knives, forks, food, balls, etc. When larger they throw stones, skippers, snowballs, water soakers, apple stealers, corncobs, and pieces of coal. Stones are used far more than any other object in throwing. The returns show that they throw at trees, street lamps, birds, boys, horses, wagons, people, windows, church steeples, signs on street, shutters, passing trains, brass balls on top of poles, cats, dogs, fruit in trees, chickens, and barns. About 40% of the boys threw at cats, dogs and birds. One of the returns gives an account of a boy with a stone in his hand slipping up to a pigeon walking about in the street and throwing at it. He struck the pigeon on its leg and broke it, and as the pigeon flew the leg dangled in the air; as the boy saw this he shouted with delight. Animal targets seem to give more pleasure than inanimate ones. This is especially true when snowballs are used. Great numbers of instances were given of boys hitting adults with balls. One lady indignantly remarked that the boys had become a nuisance and that she could not pass along the street without being pelted with snowballs. There were several accounts given of boys who used stones to fight with each other with more or less serious effects. The sling shot was mentioned at least 100 times, as a means of throwing stones. It could not be ascertained whether the boys ever invented one or not but that it appeals very strongly to the boys is quite clear.

Throwing contests are frequent and distance and accuracy are both aimed at. Throwing across a river, over a tree or building, or at some distant object tests the force of the effort. Various objects are used to test the accuracy of the throwing. There are also a great variety of games with the ball which involve throwing. These appeal greatly to boys, and as we know may develop into a permanent interest and lead to continued practice all through youth and young manhood.

The striking and throwing instinct and tendency of the child is out of all proportion to that which it would be if

it were a mere matter of imitation. Thus we must go to the early development of man for a key to the problem. Both striking and throwing involve mainly the racially old and fundamental muscles of the shoulder, arm and trunk. Both must have developed early in the life of man.

After our ancestors had descended from their arborial life and took their erect position on the ground they had the use of their upper limbs for purposes other than those of locomotion. This enabled them to devote their hands to use in their quest for food and also more directly for purposes of attack and defense. The life in the trees had already developed the hand to some extent, and now the use of the hand and arm were constantly brought to bear in the daily life of the individual. With the free use of the hand it is not surprising that in the course of time our ancestors should have come to hold a stick in their hands, and, by swinging it, strike it against the earth or some other solid object much as an infant would do under similar circumstances. As in the case of the infant this might have to be repeated a number of times before its full significance dawned upon the individual. If, as Lotze says, we instinctively project our sense of self to the end of whatever we handle, such as a stick or other object, it can readily be seen how this primitive being would come to have a sense of increased length of arm. The force and effectiveness of the blows which he could deliver would also be very evident to him. The advantage of the use of such a stick or club was almost incalculable to the user in the struggle for supremacy with animals and perhaps other persons of his or other tribes who had not yet learned the use of this weapon. It might even be compared to gunpowder as a means of conquest and civilization. It insured food with greater ease and therefore gave leisure to fight. This emboldened the tribe with this advantage, to enlarge its domain and seek new regions for food. This led to new dangers from wild beasts and other foes and so put the favored tribe to greater and greater tests, and thus weeded out those less gifted in the use of the new instrument of warfare and left those most skilled in its use. In this way through the process of selection and the survival of the fittest the good strikers remained and handed their inheritance to after generations. The ages that must have elapsed while even such a simple thing as the use of a stick or club evolved to a high degree of perfection, must have been long; thus this power could easily become a real means of selecting those who were best fitted by virtue of bone, muscle, and brain centres to survive, and of weeding out those not so well adapted to this means of offense and defense. Again, some genius of the tribe may have modified and im-

proved the original club, and as the generations went by there were evolved all primitive means of striking, such as the ax, the hammer for crushing food, grains, nuts; the sword and other "instruments of warfare, industry and even sport."

That this long process of evolution, extending over a great period of time, should have left its stamp upon the soma and psyche of the race and thus upon modern childhood and early youth can hardly be doubted. We thus have at least a tentative explanation of this impulse of the child to strike anything and everything with such satisfaction, and of the youth who is never so happy as when he has a stick or whip in his hand striking real or imaginary objects.

As it was with striking so was it with throwing. There seems to be little doubt that this developed in the race as it does in the individual, namely from striking. In either case the only thing necessary to lead from striking to throwing would be that the instrument used for striking should accidentally leave the hand of the user while in the act of striking. Again, as in the case of the child, this might not teach its lesson the first time. But finally it would force itself upon the notice of the user and the force with which it would leave his hand and strike some object would finally be grasped. Here would be revealed the new power of bringing about results at some distance from the person throwing.

This again must have given new power for conquest that we can hardly overestimate. Here, again, perfection of the art meant new conquests, new dangers, and the application of the law of the survival of the fittest, and the handing down of this inheritance to after generations. Thus the tendency of the child to-day to throw balls, stones, snowballs, apples and anything else that he can get hold of, has its origin in these past ancestral experiences. The lovers of base ball may even be indulging in and expressing ancestral echoes.

It is a pretty well-established fact "That the fixedness of a tendency is roughly proportional to the length of time during which it has characterized the race." (Tyler, in the "Man in the Light of Evolution," p. 139.) The slow progress which our ancestors made gave this tendency an abundant opportunity to become deeply engraved upon the brain centres. This is illustrated in the animal world by "The shepherd dog and the bird dog brought up in the house apart from sheep and birds, who went the one after sheep and the other after birds as soon as turned loose in the fields. The stimulus of the appropriate object was all that was necessary to arouse the slumbering inherited instinct in the brain." (Tyler, in the "Man in the Light of Evolution," p. 137.)

The value of this point of view in its bearing upon educa-

tion is evident and has been frequently emphasized in recent years. What is needed most of all to-day in the educational world is a proper perspective of child development. Biology has given us a pretty definite outline of the evolution of the body in that it has discovered the different stages of growth through which it passes, from conception to maturity. This needs to be applied to the psyche and clothed with flesh and blood and made a living, breathing reality; for the psyche, too, has these stages which express themselves spontaneously if given an opportunity to do so. Tyler says, "The interests of the child are as truly symptoms of the attainment of a certain stage of development and real needs as the craving of the legs for exercise or hunger of the body for food," and if the stages of the soma and psyche are not given an opportunity to have their normal course they are likely to become the source of imperfections in adult life. We must come into phylogenetic rapport with the child if we are to undertake to guide his physical and mental growth successfully. It is becoming more and more clear as the child study material accumulates that the child has feelings, motives, instincts and interests that should guide the educator in his work rather than that the educator should undertake to direct and modify the child's development. The child must be allowed to evolve naturally and in harmony with its racial inheritance. But in the school work of to-day the social inheritance of comparatively recent times continues to be imposed upon the child and the deeper impulses of its soul are scarcely touched.

The composite picture of the children's activities given above tend to be misleading so far as the individual child is concerned. Perhaps no single child actually engaged in all these activities. But it is just as true that every child has more or less marked dormant impulses to do all these things, and would do them, if the environment were such as to encourage their expression. Here, then, is the great and crying need of the child. It is needless to say that there are hundreds of other vague instincts, motives, and interests in the child's soul besides those above referred to. The full and complete expression of these would give every child a richness of mind that would characterize it all through life and enlarge its sphere of interests to an extent hardly dreamed of now.

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THE MEASURABILITY OF ATTENTION BY PROFESSOR WIRTH'S METHODS

By L. R. GEISSLER

In a recent number of the *Psychologische Studien*, Professor Wirth publishes an article entitled "Zur Messung der Klarheitsgrade der Bewusstseinsinhalte,"[1] which is a reply to my "Critique of Professor Wirth's Methods of Measurement of Attention."[2] The Reply consists of twelve sections, consecutively numbered; and the reader naturally infers that it presents twelve different objections to my Critique. As a matter of fact, the contents of the sections are not sharply differentiated, and the argument of one is sometimes repeated in others. Hence I shall not attempt to take them up in order, but shall merely refer in parenthesis to the particular section in which the point under discussion receives the greatest emphasis. I shall, furthermore, confine myself to the four articles mentioned in my previous paper.[3] Wirth's book, "Die experimentelle Analyse der Bewusstseinsphänomene" (§ 1), arrived here after my manuscript had gone to print, and I was, therefore, unable to reply to it,—although this explanation may seem inadequate to my opponent, who devotes more than a page to my work on "The Measurement of Attention" some half year before its appearance[4] (§ 6 and § 10). I do not deny that Wirth's book clears up some of the obscurities here mentioned, just as his Reply is in some respects an illuminating and welcome commentary upon his own work; but these facts do not affect the validity of my original criticism. I am sure, too, that my article contains nothing to justify the personal attacks scattered throughout Wirth's pages. The charges are not only absolutely untrue to fact, but they are also unsuitable for public discussion and refutation. I shall make no reference to them in what follows.

The keynote of Wirth's article is the complaint that he has

[1] *Psych. Stud.*, V, 1909, 48-72.
[2] AM. JOUR. OF PSYCH., XX, 1909, 120-130.
[3] Zur Theorie des Bewusstseinsumfanges und seiner Messung, *Phil. Stud.*, XX, 1902, 487-669; Die Klarheitsgrade der Regionen des Sehfeldes bei verschiedenen Verteilungen der Aufmerksamkeit, *Psych. Stud.*, II, 1906, 30-88; Die Bestimmung der Aufmerksamkeitsverteilung innerhalb des Sehfeldes mit Hilfe von Reaktionsversuchen, A. Kästner and W. Wirth, *Psych. Stud.*, III, 1907, 361-392; IV, 1908, 139-200.
[4] AM. JOUR. OF PSYCH., XX, Oct., 1909, 473-529.

been entirely misunderstood. The possibility of misunderstanding I frankly admitted; Wirth's language, I said, is "both difficult and obscure," and is "not always consistent;" and indeed, any one can verify the point for himself by trying to translate some page of Wirth's writing into another language. I, therefore, offered my "interpretation of Wirth's attitude . . . with all reserve," and I am now merely repeating a former statement when I say that I was in constant doubt as to the very nature of his main problem (§§ 1-5). Nevertheless, in my discussion of Wirth's results, I tried to keep the two possible forms of his problem equally in mind, and to remember that his intention might be to measure either the range of consciousness or the range of attention only. Hence Wirth's principal accusation, that I have simply and completely misunderstood him, is incorrect. I may complain, on my side, that in some points at least he has misunderstood me, and has interpreted my remarks in such a way as to exaggerate, or even to create, difficulties which did not exist either in my words or in my thought. Moreover, he often criticises me, without reason, rather for what I have not said than for what I did say.

Thus, with an experimental arrangement as complicated and a method as elaborate as his, it was impossible for me to do justice to all details in a short discussion. For I did not, as Wirth puts it at the beginning of his Reply, intend my article to be "eine Orientierung über den gegenwärtigen Stand der experimentellen Analyse der Aufmerksamkeit."[1] I did not even offer an exhaustive review of Wirth's own work, but merely "a discussion of his contributions to the subject."[2] Again, Wirth's interpretation of my sentence: "thus the results confirm and extend those of previous tachistoscopic experiments upon the range of attention," implies that I had written: "of *his* previous experiments, etc." (§ 5).[3] His statement that I had failed to see the logical relation of the "entweder—oder" (§ 5) in Wundt's discussion of Wirth's tachistoscopes, I can only characterize as amazing. As a matter of fact, I had never even hinted at a reference to that particular phrase. I simply mentioned Wundt's belief that the tachistoscope may be used for measuring not only the range of attention, but also the "Gesammtumfang des Bewusstseins."[4]

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[1] *Psych. Stud.*, V, 48.

[2] Am. Jour. of Psych., XX, 120.

[3] *Ibid.*, 57. For the same reason his objection to the word "extend" falls to the ground. Another obvious case of misunderstanding is the Footnote, p. 61 of his Reply (§ 8).

[4] *Physiol. Psych.*, III, 1903, 358 f. "Je nach der Anwendung dieser

But the climax of Wirth's misrepresentation is found in his objections to my discussion of his reaction-experiments (§ 12). I did not, it is true, mention the fact that their purpose was purely negative; that is, that Wirth meant to compare reaction-times (which have frequently been assumed to express variations of attention) with the results obtained by his previous method (the *Schwellenmethode*), in order to show that they do not afford as reliable a measurement of attention as do his liminal clearness-values. But then he himself makes no such explicit statement, either in the form of a problem or in that of a conclusion. The only passages which hint at any purpose, with regard to the reaction-experiments, are the following: "da es uns vor allem darauf ankam, die Resultate auf die früheren Klarheitsmessungen nach der Schwellenmethode zu beziehen," etc.;[1] and "wenn irgendwo, so scheint nun gerade für die Abhängigkeit der Reaktionszeit vom Klarheitsgrade der Motivauffassung, *die wir hier im einzelnen untersuchen wollen*," etc.[2] From these two incidental passages the reader is left to conclude for himself what the "entscheidende Hauptpunkt" of the investigation is; namely, as Wirth now says in his reply, but had not said before, "dass die Methode der (sensoriellen) Reaktion an der Hand der unter vergleichbaren Bedingungen gewonnenen Resultate nach der *Schwellenmethode*, *die allein für uns als Klarheitsmass gilt*, daraufhin kontrolliert werden sollte, wie weit sich die Klarheitsverhältnisse auch in dem Zeitwert wiederspiegeln."[3] This implication was not observed by me, nor seemingly by A. A. Grünbaum,[4] who lately published a more elaborate review of Kästner and Wirth's reaction-experiments. For Grünbaum the problem of the investigation is simply to find out "wie das Klarheitsrelief, das durch verschiedenartige Verteilung der Aufmerksamkeit erreicht wird, sich in den Reaktionszeiten wiederspiegelt." There is here no mention of a proposed comparison with the results of the *Schwellenmethode*. Nor does this problem occur to Grünbaum when he actually compares the results obtained by the two methods. He merely says: "man sieht leicht,

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verschiedenen an dem Apparat möglichen Versuchsweisen kann man denselben entweder, ähnlich wie das Falltachistoskop Fig. 339, zu Bestimmungen des Umfangs der Aufmerksamkeit, oder aber auch zu Versuchen über den Gesammtumfang des Bewusstseins verwenden," etc. "Ein zweiter Apparat, mit dem in einer von der soeben beschriebenen etwas abweichenden Weise sowohl Umfangsbestimmungen der Aufmerksamkeit durch momentane Apperceptionsversuche, *wie solche des Gesammtbewusstseins* . . . ausgeführt werden können," etc. (Italics are mine.)

[1] *Psych. Stud.*, III, 387.

[2] *Ibid.*, 390. (Italics are mine.)

[3] *Psych. Stud.*, V, 69.

[4] *Zeits. f. Psych.*, LIII, 1909, 97-102.

dass beide Reihen nicht annähernd parallel verlaufen,—was nach der Verschiedenheit der psychologischen Bedingungen beider Methoden auch zu erwarten war, wodurch aber auch die Möglichkeit einer objektiven Wiedergabe des Klarheitsreliefs nach beiden Methoden in Frage gestellt wird."[1] I confess, too, that I do not see why, if Wirth objects to the assumption that his reaction-experiments were meant to be "eine Methode zur Messung der Klarheitsgrade,"[2] he should compare their results with those of his *Schwellenmethode*. And why does he speakof an "Übereinstimunng der beiderseitigen Aufmerksamkeitsmasse?"[3] Surely, such language is both inconsistent and misleading.

Aside from these more technical issues, there remain certain important points concerning which a real disagreement seems to exist between Wirth and myself. In the first place, I cannot follow Wirth in drawing a sharp distinction between "the activity of attention as the most important subjective condition of a certain formation of the clearness relievo" and "the actually attained degree of clearness" (§ 3).[4] I myself never experience anything like an 'activity,' which might be supposed to be under voluntary control, nor have I ever met with it in the introspections of my observers; and the psychologists who occasionally mention it in experimental contexts, do not agree as to its nature. Hence the meaning of the phrase is not as unequivocal as Wirth assumes it to be.[5] For my own part, I must continue to identify the 'activity of attention' with the attained degree of clearness.

Another point upon which I disagree with Wirth concerns the general nature of the attentive consciousness, especially in the tachistoscopic experiments. I happen to have taken part lately in over one thousand monocular tachistoscopic observations on liminal and slightly supraliminal brightness-

[1] *Ibid.*, 99.
[2] *Psych. Stud.*, V, 69.
[3] *Psych Stud.*, IV, 156.
[4] *Psych. Stud.*, V, 52.
[5] Perhaps Wirth's distinction is meant to be identical with Wundt's distinction between *Aufmerksamkeit* and *Apperception*, as it is presented in the *Physiol. Psych.*, III, especially 341: "Nach allem diesem sind Aufmerksamkeit and Apperception Ausdrücke für einen und denselben psychologischen Thatbestand. Den ersten dieser Ausdrücke wählen wir vorzugsweise, um die subjective Seite dieses Thatbestandes, die begleitenden Gefühle und Empfindungen, zu bezeichnen; mit dem zweiten deuten wir hauptsächlich die objectiven Erfolge, die Veränderungen in der Beschaffenheit der Bewusstseinsinhalte an." Wirth's "activity of attention" would then be identical with Wundt's "Thätigkeitsgefühl." But it is well known that this side of Wundt's apperception theory has been sharply criticised, and has found little acceptance.

differences which, placed about 12cm to the left of a constant fixation point, were exposed for one hundredth of a second and judged under three different distributions of attention. The conditions were very similar to Wirth's, although, of course, they were far less complicated. In these observations, my attention was for the moment raised to the very highest pitch of concentration, while the background was so obscure that I could not possibly analyze it. I have found certain observers who agree with me in experiencing, under these conditions, a marked difference between maximal and minimal clearness-levels, while others distinguish simultaneous processes of intermediate clearness-degrees. This difference, which is borne out by the results of a large number of systematic experiments on degrees of clearness,[1] has led me to assume two different types of the attentive consciousness, the 'dual-division' and the 'multi-level' formation. Evidently Wirth, and probably also Wundt, belong to the latter type. Whether Wirth's results would have been different if he had had observers of the first type, it is impossible to say. But it still remains a disadvantage of his experimental work that in all of the final series he was the sole observer (§ 10). The same objection is implied in Grünbaum's review, although he refrains from making it an explicit criticism.[2] It is true that Wirth made preliminary experiments with several less skillful observers; and he regards the results as utilizable, because they show a rough agreement with some of his own observations obtained at an early stage of practice. Nevertheless, these other observers made binocular, and not monocular observations upon a plane, and not upon a funnel-shaped field of vision; so that the experimental conditions in their case were quite different from (much simpler and easier than) those under which Wirth himself later completed the final series I might add that Grünbaum also considers Wirth's experimental conditions as too complicated and artificial, and the requirements made upon the observer's attention and introspective self-control as too difficult (if not even self-contradictory), to guarantee a successful solution of the problem.

Finally, Wirth objects to my using collectively the results of his *Schwellenmethode* (§ 11). I combined into a single frequency curve all the numerical clearness values given in his six schemata, each schema representing a different distribution of attention. The reason for his objection is that some of the schemata were obtained at an earlier, some at a later stage of

[1] The Measurement of Attention, Am. Jour. of Psych., XX, 1909, 473-529.
[2] *Op. cit.*, 98.

practice in observation. Nevertheless, in his own final conclusions, Wirth neglects this practice-effect altogether, and directly compares with one another the results expressed in the various schemata. Besides, I had, for my own satisfaction, constructed individual frequency curves for all the different distributions of attention, and had found great similarity among them; so that for my particular purpose I saw no further necessity of separate treatment. However, even if the different stages of practice had influenced the results, I might justly have followed Wirth's example in his application of the principle of analogy, and might have assumed that longer practice would probably eliminate large irregularities in the frequency distribution.

In conclusion, I still maintain that Wirth has failed to solve his problem, not because, as he tries to show, I had been mistaken in its nature, but because, as I have said before, his numerical clearness values were "obscured or invalidated by complicating factors," and because "the restricting conditions of his experimental arrangement" served only to enhance "the impossibility of overcoming difficulties of observation" whose existence he himself has frequently admitted.

MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF VASSAR COLLEGE

XII. The Sources of the Affective Reaction to Fallacies

By Anna H. Taylor and M. F. Washburn

About a hundred young women students, mostly college Juniors, were asked to introspect the impression produced upon them by a set of logical fallacies. In the original plan six of these faulty arguments were used, the design being to have two specimens of each of the three types of formal fallacy: illicit major, illicit minor, and undistributed middle; and to construct one of each pair with a true conclusion, the other with a false conclusion. In practice, the syllogism used to represent the fallacy of illicit minor with a true conclusion proved unsatisfactory, being so obviously wrong as not to produce the impression of an argument at all, and it was therefore discarded. The observers were asked in the first instance to record whether the arguments were agreeable or disagreeable, and then to report any further considerations that occurred to them. The great majority of them had had no training in formal logic. Nineteen had pursued a course in argumentation, and seven had studied logic in preparatory schools. Fifty-four, however, had had a course in introductory philosophy, in which the syllogism had been briefly explained.

The following were the faulty syllogisms used:

1. (Undistributed Middle: true conclusion.) "All trees are vegetables; all oaks are vegetables, therefore all oaks are trees."
2. (Same: false conclusion.) "Virtuous people always make profitable use of their time; day laborers make profitable use of their time, therefore day laborers are virtuous."
3. (Illicit Minor: false conclusion.) "Only criminals should be put under restraint; for all criminals are dangerous to society, and all persons who are dangerous to society should be restrained."
4. (Illicit Major: true conclusion.) "Church property is not taxed; for it is not private property, and all private property is taxed."
5. (Same: false conclusion.) "Mathematical study improves the reasoning powers; but as the study of logic is not mathematical study, we may infer that it does not improve the reasoning powers."

The papers that were handed in proved to contain material of much interest, but material with which it has been by no means easy to deal. As any one who has undertaken a similar task knows, analyzing and classifying a large mass of introspective results involves the danger of falsifying them. In the desire to bring order out of chaos, statements are brought together under the same heading that represent really different mental processes; and in general much of the value of the introspections is lost by the cutting and drying process to which they are subjected. A great amount of the most careful study has been devoted to the reports of our observers in the

present instance; they have been gone over again and again, and as a result we think we have gathered some information about the sources through which a mistake in reasoning produces an unpleasant effect upon the mind. These sources, as they appear from the introspections of our observers, we shall now discuss one by one.

(*a*) The *content* of the ideas contained in the syllogism. By this is meant that in a certain number of cases, the first affective reaction of the observer was to the agreeable or disagreeable character of one of the terms of the argument, or some directly suggested idea; and in other cases this was one of the sources of pleasantness or unpleasantness. For example, in (3), the idea of criminals, or of the insane, was unpleasant; in (2), the idea of day-laborers and in (5), the idea of mathematics were disagreeable. The number of observers reporting this as an important source of their affective reaction was for (2), eight; for (3), four; for (4), one, and for (5), five. Evidently such a source of pleasantness or unpleasantness as this is not in any way characteristic of the reasoning processes as such. The ideas of mathematics or of criminals would have been just as unpleasant if they had been suggested outside of any argumentative context, for instance, in a series of disconnected words. In the case of the first argument, a special instance of affective reaction determined by the content of the idea was the unpleasantness experienced by many of the observers on account of the incongruous images suggested by 'tree' and 'vegetable.' Eight persons gave this as the only reason for finding the syllogism unpleasant, and two of these said that as soon as 'vegetable' was understood in the scientific sense the argument became pleasant; thus evidently wholly overlooking the fallacy. Fifteen others found the incongruity one among various reasons for the unpleasantness of the syllogism. Incongruity, as a source of unpleasantness, is evidently 'relational' in character; it involves what is commonly known as thought rather more than do the other instances of the content of ideas as affective source, where nothing more than the mere reproduction of an image is necessary.

(*b*) The *truth* or *falsity* of the statements. In the case of the second argument twelve persons reported that they found it unpleasant merely because they denied the truth either of the conclusion, or of the conclusion and one of the premises. Eight persons gave the falsity of the conclusion in (3) as their only reason for disliking the syllogism, and three mentioned it as one among other reasons. Three observers reported the falsity of the conclusion, in (5), as the only source of unpleasantness, and five gave it as one source. What mental processes are involved in recognizing that a statement is false? Our data throw light on this problem in a few cases only. The conclusion of (2), that day-laborers are virtuous, aroused in those observers who analyzed their consciousness of its falsity a sense of the incongruity of the subject and predicate; several reported that they had a mental picture of a gang of workmen, dirty, quarrelsome, and disorderly. In other cases it is probable that the consciousness of incongruity was present without involving any images. The conclusion of (3), that only criminals should be put under restraint, instantly suggested to most of the observers who were disturbed by its falsity the idea of insane persons at large; in three cases the idea of a particular insane person. Here the hitch came between the word 'only' in the conclusion and the thought of the insane, and the feeling not merely of incongruity but of incompatibility or contradiction was aroused. Into the more ultimate nature of these "feelings' our data do not allow us to go. In the case of (5), those observers who were disturbed by the falsity of the conclusion that logic does not improve

the reasoning powers seemed, as nearly as we could judge, merely to be conscious of the contradiction between this statement and statements to the contrary which they had previously met with; that is, no images were called up, and very likely only verbal formulas regarding the value of logic were suggested, if anything more than a bare 'feeling of dissent' was present. In so far as we get any information from our results, the consciousness of the falsity of a statement may involve (1) a vague feeling of dissent or negation, (2) a feeling of incongruity or incompatibility between the subject and predicate of the statement; (3) a feeling of incongruity or incompatibility between some idea contained in the statement and other ideas not contained in it but suggested by it. Whatever its nature, evidently the consciousness of the falsity of one of the statements in an argument is something aside from the process of reasoning involved in the argument itself; the statement would be unpleasant on account of its untruth even if it stood alone and unconnected with the other propositions of a syllogism, just as the content of an idea might be disagreeable although the idea was suggested in isolation.

(*c*) A sense that something *definite* has been *omitted*. In the first syllogism, each one of the three propositions is true. Six of the observers recorded that they experienced unpleasantness from this argument because they thought at once of many other vegetables besides those mentioned in the premises. Here for the first time we have a source of unpleasantness that is truly logical. Only a part of the 'middle term' is referred to in either premise, and the reasoning process, which ought to pass smoothly from minor to middle and from middle to major term, is broken and interrupted by the occurrence to the mind of other ideas, such as those of cabbages and carrots, which are as naturally suggested by the middle term 'vegetables' as is the major term 'trees.' With the occurrence of these other ideas comes a sense that they should have been taken account of in the argument, and a consequent unpleasant affective tone. Four observers found the chief source of unpleasantness in the fourth argument to lie in the thought of other kinds of property being taxable besides private property. Here the discomfort seems to arise from the fact that the thought process, which should pass smoothly along the course: 'church property—other than private property—not taxed,' is led off from the middle term 'other than private property' to the thought of cases of public property that are taxed. None of the observers, however, reported that they thought of specific instances of public property being taxed; the 'sense of something omitted' was not as definite as in the case of the first syllogism. In (3), the idea of insane people presented itself with more or less definiteness as needing to be taken account of to render the argument logical (not merely to make the conclusion true) in the minds of nineteen of the observers, if we may judge by the fact that this number of them said the word 'only' should be changed to 'all.'

(*d*) Closely connected with the source of unpleasantness just mentioned is one which may indeed be the same experience in a different stage of development: the sense of a definite *lack of equivalence* beteen the terms. For example, in the case of (1), five of the observers said the argument was unpleasant because "two sub-classes of the same class are not necessarily identical," or words to that effect. Seven others found it disagreeable because it involved an attempt to apply the mathematical axiom that things equal to the same thing are equal to each other, where such an application could not be made. In the case of (2), eight persons said that one quality common to two classes did not make them identical, and four put the same idea from

what the logician would call the point of view of extension, by saying that two parts of the same class are not necessarily identical. In these instances the observers' state of mind seemed to be not so much the consciousness of certain ideas that should have been but were not included in the argument, like the 'carrots and cabbages' in (1) or the insane people in (3), as a more vague and abstract mental process for which no more fitting descriptive term than 'consciousness of inequality' presents itself. Such a mental process must be of frequent occurrence in purely mathematical reasoning. It probably varies from a practically unanalyzable 'relational' process, through a more complex process associated with some vague ideas of the omitted factors, the other parts of the class which have not been taken into account, and thus by imperceptible gradations may pass into a process involving definite thought of the neglected ideas, such as we have discussed under (c). It is to be noted that the mere 'consciousness of inequality' would not of itself be a source of unpleasantness; the unpleasantness must arise from the fact that the terms *ought not* to be unequal. The thought of two sub-classes as not being identical with each other would not be disagreeable unless the argument demanded their equality. Is it not probable that the unpleasantness in this case arises ultimately from the same source as it did in (c);that is, from the confusion and division of attention that result when instead of passing smoothly from one term to the next, attention is 'led aside' to consider the omitted factors? In the instances we are considering, the omitted factors are not definitely thought of as they are in the cases under (c), but even although they are represented only by an unanalyzable relational process, the affective tone which would accompany the clear and developed thought of them may be transferred to the relational 'consciousness of inequality.'

(*e*) Under this head we may consider the cases where unpleasantness arose because of a quite vague and *indefinite sense* of *something wrong* with the argument. The observer cannot or at least does not state that anything is wrong with a particular part of the reasoning; she does not 'place' the wrongness; it is only vaguely felt. "Something is wrong with the 'therefore,'" said two observers in the case of syllogism (1). Two persons complained that (5) was 'unconvincing' and therefore unpleasant. Four gave 'incompleteness' without further specification as the source of unpleasantness in (1). It is, of course, impossible to be sure, with our untrained observers, that the sense of incompleteness was in every case perfectly vague; the omitted factors might have been thought of with some definiteness although the observer did not take the trouble to report the fact. But it seems probable that a sense of something lacking did sometimes accompany the reading of the arguments without being attached to anything definite. The term most frequently used to describe the vague sense of something wrong was 'confusion.' Five persons named this as the sole source of unpleasantness in the first syllogism; three in the second, four in the third, five in the fourth, and two in the fifth. 'Confusion' would seem to be one degree vaguer than a sense of 'something omitted.' One might enumerate the logical sources of the unpleasantness of a fallacy in the following order, beginning with the most indefinite, the passage from each stage to the next being brought about by better attention and analysis: general sense of confusion, sense of something omitted, sense of a lack of equivalence between two of the terms, clear idea of the omitted factors. All of these processes are unpleasant for what is ultimately the same reason: a tendency to division of the attention instead of allowing it to pass smoothly from one term to the next.

(*f*) It will not be inappropriate to consider under a special heading the reports of certain observers who were distinguished from the rest through taking what we may call a *subjective* attitude towards the arguments, or perhaps 'personal attitude' would describe it better. In most of these cases there was probably recognition of the fallacy, in some sort of terms, but the unpleasantness attached either to the thought of the observer herself as being the subject of an attempt to deceive, or to the imaginary propounder of the argument. In the case of (1), three persons described their attitude as one of 'irritation' at the maker of the argument; one said she felt 'scorn,' another confessed to a 'pugilistic impulse,' and still another declared the author of the syllogism to be "beyond the reach of argument." Three, on the other hand, felt wounded self-esteem, a 'sense of being deceived.' These experiences were mentioned in the case of the other arguments also. They show how close the connection may be between intellectual processes and the fighting instinct.

(*g*) Three observers gave their general dislike of formal arguments as the chief reason for finding the syllogisms unpleasant.

We must also take into account those observers who found the arguments either wholly or partly *pleasant*, and those who experienced no reaction at all. The percentage of observers finding the syllogisms wholly agreeable was for (1), seven; for (2) twelve; for (3), ten; for (4), twelve, and for (5), nine. The percentage of observers finding the arguments partly pleasant and partly unpleasant was, for (1), eleven; for (2), three; for (3) six; for (4), five, and for (5), four. The percentage of those finding the arguments neither agreeable nor disagreeable was for (1), ten; for (2), fourteen; for (3), eighteen; for (4), twenty, and for (5), seventeen.

What were the sources of pleasantness? In a few scattered instances they were found in the content of the ideas suggested, as when one observer declared that she found (2) pleasant because it was agreeable to think of virtuous people making profitable use of their time. But the principal sources were (*a*) thinking the syllogism correct, which was done by ten per cent. of the observers in the case of (4), by two per cent. in the case of (1), and by two per cent. in the case of (3); (*b*) amusement, which was felt by from one to six per cent. of the observers in the case of every argument, and (*c*) the enjoyment of tracing and correcting the fallacy, which from two to four per cent. reported with all the arguments. The comparatively large number of persons who thought the fourth syllogism correct may perhaps be accounted for by the unfamilar character of its subject-matter, which very likely obscured the logical processes involved. No special discussion of these sources of pleasantness seems justified by the data at our command. And if, in general our discussion and analysis of the experiences of our observers appears to be far from thorough, our excuse must lie in the fact that their introspective records were not full enough to warrant us in interpreting the results further. If the observers had been trained in introspection we should have gained much, but we should have also lost something, in that our subjects would have been alike less numerous and less naïve.

XIII. Some Tests by the Association Reaction Method of Mental Diagnosis

By Hazel M. Leach and M. F. Washburn

In the experiments whose results are discussed below we followed the method of Yerkes and Berry (this *Journal*, Vol. 20, page 22), with some slight modifications; our design being to test the method on as many observers as possible. Each observer was first given a practice series of twenty-five words, being told that on hearing a word she was to speak as quickly as possible the first associated word that occurred to her. The reaction times were taken with a stop-watch. The observer was then directed to go to another part of the laboratory and open one of two boxes that she would find there. On her return she was told that she must try by every possible means to keep the experimenter from learning into which box she had looked. Her reactions to a series of sixty words were then taken. In this series there were ten words referring to the contents of one of the boxes, and ten referring to those of the other box. These relevant words were scattered in among the others, but three or four words referring to the same object were given in immediate succession to increase their disturbing effect upon the observer. Twenty-six persons were tested, and all but one of these were observers in two experiments each, with different pairs of boxes. In one experiment, the objects in the boxes were a bottle of red ink and a watch; in the other, they were a toy snake and a rag doll. Later a pack of cards was substituted for the doll. The following were the stimulus words:

Series I. Ink bottle—watch.

1.	View.	21.	Door.	41.	Pond.
2.	Bird.	22.	Window.	42.	Drama.
3.	Lily.	23.	Evening.	43.	Church.
4.	Satin.	24.	Sugar.	44.	Bottle.
5.	Stitch.	25.	Sharp.	45.	Eraser.
6.	Position.	26.	Blotter.	46.	Cork.
7.	Walk.	27.	Pen.	47.	Indian.
8.	Spring.	28.	Glass.	48.	Remark.
9.	Tick.	29.	Red.	49.	Star.
10.	Second.	30.	Smile.	50.	Clay.
11.	Hands.	31.	Heroine.	51.	Doll.
12.	Good.	32.	Anthem.	52.	Fish.
13.	Indoors.	33.	Columbus.	53.	Orange.
14.	Nobody.	34.	Shop.	54.	Gold.
15.	Sleep.	35.	Lamp.	55.	Fob.
16.	Cow.	36.	Time.	56.	Mainspring.
17.	Carter's.	37.	Elgin.	57.	Nails.
18.	Fluid.	38.	Hour.	58.	Floor.
19.	Write.	39.	Boy.	59.	Box.
20.	Meat.	40.	Castle.	60.	Drink.

It will be seen that numbers 8, 9, 10, 11, 36, 37, 38, 54, 55, and 56 are the relevant words for 'watch'; while numbers 17, 18, 19, 26, 27, 28, 29, 44, 45, and 46 are the relevant words for 'red ink bottle.'

Series II. Snake—Doll (Cards).

1. House.
2. Earthquake.
3. Sky.
4. Telepathy.
5. Clue.
6. Tree.
7. Radius.
8. Boston.
9. Gray.
10. Crawl.
11. Slimy.
12. Bite.
13. Study.
14. Morning.
15. Room.
16. Comfort.
17. Rain.
18. Apple.
19. Face (Bridge).
20. Red (King).
21. Finger (Diamond).
22. Question (Joke).
23. Net.
24. Horse.
25. Royal.
26. Companion.
27. Word.
28. Disgrace.
29. Nothing.
30. Baby (Club).
31. Dress (Deal).
32. Calico (Card).
33. Fiction.
34. Suffrage.
35. Shock.
36. Home.
37. Picture.
38. Wave.
39. Coil.
40. Poison.
41. Rattle.
42. Train.
43. Liberty.
44. Sun.
45. Washington.
46. Law.
47. Pencil.
48. Teddy Bear (Play).
49. Stuffed (Spade).
50. Blue (Heart).
51. Lips (Question).
52. President.
53. Salt.
54. Tennis.
55. Friendship.
56. Ticket.
57. Adder.
58. Wriggle.
59. Pang.
60. Servant.

The words in parentheses were used only in the experiments where the cards were substituted for the doll. Numbers 9, 10, 11, 12, 39, 40, 41, 57, 58, and 59 were relevant to 'snake'; numbers 19, 20, 21, 30, 31, 32, 48, 49, 50, and 51 to 'doll'; numbers 19, 20, 21, 22, 30, 31, 32, 48, 49, and 50 to 'cards.'

One of the authors of the paper, H. M. L., acted as experimenter throughout. The results did not come into the hands of the other author until after the entire series of experiments was finished and H. M. L. had recorded her judgments as to which box the observer had investigated in every case. H. M. L.'s decision was based partly on the average reaction times for the words referring to one object, as compared with the average reaction time for words referring to the other object; partly on the character of the associations. In one single experiment only, that is, one of the two series given to one of the observers, was this judgment incorrect. This means one error out of fifty-three experiments. *In all the experiments but four, the average reaction time for words referring to the object actually looked at was longer than that for the words referring to the other object.* One of these four cases was the case where H. M. L.'s judgment was incorrect; in the other three she judged correctly from the nature of the associations. It was noteworthy that the *shortest two average reaction times on the entire list were those for words referring to the object seen*, forming two of the four exceptions to the rule that the average reaction time to such words is long. H. M. L. concludes from this that in rare cases the dangerous words are reacted to with abnormal quickness. In both the instances here noted, the observers made no effort to prevent the significant words from suggesting the object seen, and the result was that such suggestions came more rapidly than the rest. *Yet in both these cases the longest single reaction time was that for a relevant word.* In all but six of the experiments, the mean variation for words referring to the object seen was longer than that for words referring to the other object; thus the reaction times

to relevant words seem usually, though not invariably, more irregular as well as longer than those for words referring to the other object.

When the results were turned over to M. F. W., it occurred to her that it would be interesting to see how far correct judgments could be based on the nature of the associations alone, leaving the times out of account altogether. She accordingly went over all the associations, with the times concealed, and tried to discover in each experiment which of the two objects had been seen by the observer. The aim of this was not so much to test the practicability of ignoring reaction times,—for there would be no advantage in leaving them out of account,—as to study the nature of the considerations that enable one to base a judgment on the character of the associations, a factor that always has to be taken into account. The total number of experimental results examined was fifty-two; in thirty-four of these a correct judgment was reached; in sixteen, a wrong judgment, and in two cases it was impossible to decide. The number of correct judgments that might be accounted for by chance was twenty-five. Evidently reaction-time alone is a much safer guide than the character of the associations alone.

What, now, are the peculiarities of the associations made which lead one to infer that a particular object has or has not been seen? After examining the associated words in each experiment, M. F. W. recorded her judgment and the reasons for it; and a careful study of these reasons seems to show that the types of self-betrayal fall into two classes according as the observer does or does not try to avoid significant associations. When there is *no effort to avoid*, we have, first, the cases where *a relevant stimulus word suggests a word that would not naturally occur to a person who had not seen the object.* This may be called the most naïve type; it would be the natural method of self-betrayal if there were no effort to conceal. It proved to be rare in these experiments, and to be an uncertain indication. Only one correct judgment was based upon it, where the word 'red' suggested 'ink,' as it would not have been very likely to do unless the red ink bottle had been seen. On the other hand, in two cases an incorrect judgment was reached on the same basis; once the object was wrongly judged to have been 'snake' because 'coil' suggested 'snake,' and another time it was judged to have been the ink bottle because 'fluid' suggested 'ink.' Needless to say, the judgments in both these cases were merely tentative; the unsatisfactory nature of the evidence was recognized, and it was influential only because no other basis for judgment presented itself. More convincing were the cases where *a relevant word gave an association different from that which would have occurred had the object to which the stimulus word referred been seen.* Thus in two cases correct judgments were reached because the stimulus word 'write' was perceived as 'right,' which would hardly have been the case had the ink bottle been seen. This form of self-betrayal is classed with the preceding because in neither case need there be any effort to conceal on the observer's part. Under this same head should come the cases where *the significant associations are given with abnormal frequency.* Thus in one series where the watch had been seen, the only reaction words given were 'watch' and 'time,' repeated again and again; in another case where the cards had been seen 'cards' was given five times as a reaction word, and in still another, where the object was the ink bottle, 'ink' was given six times. On the other hand this kind of evidence twice led to a wrong conclusion, 'snake' being given seven times and again five times when it was not the object seen. If this form of supposed self-betrayal could be relied upon, it would be because it indi-

cated a kind of recklessness in the observer's mind; a more disturbed condition than is suggested by the single occurrence of a significant association. The latter would happen to an observer who had no thought of concealment at all; the former, one might suppose, would be more likely to occur with one who had made up his mind that the best way to conceal would be to say whatever came into his head. However, the fact that such repetitions did occur with reference to an object that had not been seen at all, shows that it is unsafe to argue in this manner.

Over against these we may place the cases giving evidence of *forced avoidance of significant associations.* In eight instances a correct judgment was reached partly or wholly on the ground that not one of the relevant words suggested anything connected with the object to which it was intended to refer; that is, the avoidance of significant associations was *complete.* It was concluded that such avoidance must have been intentional. But there were two cases in which a wrong judgment was reached on this basis; not a single significant association occurred, and yet there was no intention to avoid, since the object to which the relevant words referred had not been seen at all. Then there were three correct judgments made on the basis of *avoidance* of a relevant association *under circumstances that would naturally have suggested it:* (1) after 'king' had suggested 'card,' 'diamond' suggested 'bracelet,' whereas it would in the mind of a person whose associations were normal have continued the 'card' train of ideas; (2) after 'tick' had suggested 'stop-watch,' 'second' suggested 'street;' (3) after 'fob' had suggested 'watch fob,' 'mainspring' suggested 'Main Street.' Here again we have to offset these instances with a case of failure by the same method, but the mistake occurred where the application of the principle is by no means so clear as it was in the series just mentioned. After 'spade' suggested 'hearts,' 'heart' suggested 'feelings;' it was wrongly concluded that the pack of cards had been seen, but the passage to a different line of associations here might have been due to the fact that the stimulus word 'heart' was a repetition of the last reaction word, so that the observer was not unnaturally given an impulse to break away from that set of ideas in a new direction. The effort to avoid significant associations shows itself also, as has often been pointed out, in the occurrence of *far-fetched* associations. The following is a list of the associations of this character upon which correct judgments were based: 'calico—variegated colors,' 'fang—boy,' 'second—how many in an hour,' 'time—big idea,' 'deal—what kind,' 'Elgin—make,' 'mainspring—mechanism,' 'tick—glasses,' 'second—tie,' 'time—guess,' 'slimy—dessert,' 'heart—chicken,' 'Elgin—Europe,' 'mainspring—lake,' 'tick—year,' 'mainspring—time,' 'hour—National Park.' In some series two or more of these 'forced' associations were found; altogether, eleven correct judgments were based wholly or partly upon them. They may not, as reported above, seem particularly far-fetched in every case, but they were always 'peculiar,' as compared with the other associations in the series. Three erroneous conclusions were formed on account of the occurrence of associations, at least as forced as any of those above, viz.: 'fang—fishes,' 'deal—page,' 'card—hardness' (the last two occurred in the same series), 'wriggle—little girl of that name.' Again, the effort to avoid is betrayed by the occurrence of *sound* or *rhyme associations.* These were found in the case of two observers only, and a correct conclusion was drawn in each case. One gave the following associations: 'tick—click,' 'time—last time,' 'hour—glower,' 'gold—golden;' the object seen being the gold watch. The other observer, who had seen the snake, gave:

'crawl—sound of word,' 'wriggle—rig,' 'fang—hang.' Still another indication of an effort to avoid significant associations lies in *repeating the previous reaction word*. Thrice this betrayed the object seen: once when 'wriggle' and 'fang' both suggested 'lizard,' once when 'medicine' was suggested by both 'bottle' and 'cork,' and once when 'poison' and 'rattle' both suggested 'antidote.' In one series the observer took refuge in the word 'animal,' to conceal the fact that she had seen the snake; 'animal' was given in response to 'gray,' 'bite,' 'rattle,' and 'adder.' Once the *stimulus word itself*, 'hour,' *was repeated*, leading to the correct conclusion that the watch was the object seen. Finally, suspicion was aroused in one instance because the reaction word seemed to show a *reversion back to the preceding stimulus word:* 'tick' suggested 'watch' and the next word, 'second,' suggested 'ticking, but the conclusion that the observer had seen the watch proved to be untrue.

It is thus evident how uncertain are the inferences based on the character of the associations alone. Judging from these results, the most trustworthy evidence is furnished by a misunderstanding of the stimulus word in a way that would be practically impossible for a person with the object to which it referred in mind, as when 'write,' which referred to the ink bottle, was heard 'right' and suggested 'wrong;' and by the occurrence of associations based on the sound of the word. Yet if 'write' had suggested 'wrong' only after an abnormally long interval, one might correctly infer that this was a forced association, so that it would be necessary to take account of the reaction time here also; while it may have been mere chance that the rhyming associations furnished the basis of none but correct judgments in these experiments of ours. There seems to be no *à priori* reason why undue emphasis on the sound of a word should always mean a desire to avoid associations connected with its meaning.

The best single criterion on which to base a decision as to the object seen by the observer in these experiments was the *longest single reaction time*. If, in each series, the longest reaction time was selected, and was found to be that of the reaction to a relevant word, this word proved in every case but two out of the fifty-three to refer to the object seen by the observer. If the longest time belonged to the reaction to an irrelevant word, the next longest was taken, and so on until one that was connected with a relevant word was reached. *The longest single reaction time to a relevant word proved, in every series but two, to be that of a reaction to a word referring to the object seen.* This record is better than that of the average reaction times; it will be remembered that there were four exceptions to the rule that these are longest for words connected with the object looked at. The exceptions to the rule of the longest single reaction time were among these four. In one of the exceptional series, the object seen was the pack of cards; the longest reaction time was for the association 'earthquake—Messina,' earthquake being an irrelevant word. Next longest was that for 'slimy—ooze,' 'slimy' referring to the snake, which had not been seen. Both of these delays might be accounted for by the emotional significance of the stimulus words. In the case of the other exception, the object looked at was the watch, but the longest single reaction time was that for 'Carter's—people,' in which the stimulus word referred to the ink-bottle. Here the delay was doubtless owing to the fact that a person who had not seen the ink-bottle would be somewhat puzzled by the unusual stimulus word 'Carter's.' There were eight cases where the longest single reaction time was that of the association with an irrelevant word, but where the longest

time of reaction to a relevant word was that of association with a word referring to the object seen. The irrelevant stimulus words that gave abnormally long reactions were as follows: (1) 'Position—too indefinite;' here the abstract character of the stimulus word seems to have caused the delay. (2) 'Clue—detective;' the next longest r. t. was that for 'bite—scratch.' These stimulus words probably had some affective accompaniment that caused the delay. (3) 'Remark—word;' here there is no discoverable reason for the long r. t., and the same is true of (4), 'house—brown,' and (5), 'walk—parachute.' If 'walk' had been a relevant word, the far-fetched character of this association together with the fact that its time was so long, would have led to the positive conviction that the object connected with 'walk' had been seen. Unfortunately the observer's introspection on this association was not recorded. In the case of (6), 'telepathy—man,' the unusual character of the stimulus word may again have been, at least in part, responsible for the delay; with (7), 'disgrace—prison,' affective influences undoubtedly played a part. In case (8), the longest three reaction times were to irrelevant words: 'comfort—vague idea;' 'servant—play;' 'disgrace—sin.' The last two involved affective elements (the observer had recently seen "The Servant in the House"); the first gave a slow reaction probably because of its abstract character. In general it may be said that when a word referring to an object not seen gives an abnormally long reaction time this is because it (a) is of a disturbing affective character in general, like 'disgrace;' (b) refers to some emotional complex, peculiar to the observer, or (c) is abstract or unusual in character. It would seem that the rule that the longest single reaction time to a relevant word is to a word associated with the object seen may be safely followed except where some word referring to the other object comes under one of the three classes just mentioned. One could never be sure of selecting all the relevant words in a series so that none should be connected with an emotional complex peculiar to the observer, but it would be possible to avoid using, as relevant words, those of general emotional import, or those which were unusual or abstract.

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Der Mythus von der Geburt des Helden Versuch eines psychologischen Mythendeutung, von OTTO RANK. 1909. 93 p. (Fünftes Heft.)

Aus dem Liebesleben Nicolaus Lenaus, von J. SADGER. 1909. 98 p. (Sechstes Heft.)

Schriften zur angewandten Seelenkunde, herausgegeben von SIGMUND FREUD. Franz Deuticke, Leipzig und Wien.

Selected Papers on Hysteria and Other Psychoneuroses, by SIGMUND FREUD. Authorized Translation, by A. A. BRILLE. The Journal of Nervous and Mental Disease Publishing Co., New York, 1909. 200 p. (Nervous and Mental Disease Monograph Series No. 4.)

The first six of these pamphlets on applied psychology, edited by Freud himself and written or to be written by various pupils of his, are designed to bring together into one convenient series the characteristic view-points of what is, to the mind of the present writer, by far the most interesting and original line of development which modern psychology has had since the experimental movement began with Wundt. True, the Freud school have based their conclusions chiefly on the study of more or less abnormal cases; but the psycho-analytic method is only a further development of Wundt's association reactions; while the abnormal features by the Freudists, as indeed now by most psychiatrists, are regarded as modifications of the normal, some traits of which are magnified, others suppressed, so that we have simply to look on and see nature experiment. Wundt has always allowed but the smallest range to unconscious psychic processes. For him it is but a very little way from consciousness down to merely physiological processes. This error has been fatal to Wundt's influence among those who deal with every class of mental defectiveness. No psychology can abide that does not stand this perhaps most important of practical tests; and here, by unanimous and reiterated consent of those in or near the Freud camp, Wundt has already signally failed. Those who study mental alienation are drifting farther from him.

In a different way and for different reasons, Kraepelin, too, is being left behind. This writer started from the Wundtian basis and has done signal service for the world by his breaking up of the rigid, old, and the development of new, classifications. He has, however, never succeeded in reaching any very stable equilibrium, as witness the

essential changes of view-point in his successive editions. Great as his contribution has been, there can be no doubt whatever that he is being slowly left behind by those more interested in minute and careful observation, who are ready to follow facts wherever they lead and are unencumbered by schematizations which, in the Kraepelin camp, have become altogether too cumbersome. Those who have followed the Freudian literature know with what infinite patience and detail the clinical cases are followed up as the investigator penetrates to layer below layer of the patient's soul.

Freud himself is a man of wide reading and of keen literary insight and taste. His pages abound in allusions to literary masterpieces from the Greek drama down to the contemporary novels; but allusions to these he uses as entirely subordinate to his main purpose. In Vienna he has had scant recognition, being, although on in the fifties, only "extraordinary" professor; and he has been largely absorbed by his duties as a medical practitioner. Owing to the large place which he assigns to sex in the development of psychoneuroses, he has been misunderstood and for a time suffered socially. This, however, is happily past and he is now by every token likely to receive full recognition. It was an experience never to be forgotten by those who shared it to listen to the daily lectures for a week in September that he gave at the Clark conference. He spoke in German and without notes, and in a voice of so little power that his hearers drew their chairs in a semi-circle about him. But never in the writer's experience have a group of advanced scholars, many of whom have achieved great eminence in this country, listened with greater interest to the words of a great teacher. His expositions were masterpieces of simplicity, and it is hoped and believed that the lucidity of his expositions, supplemented as they were by a number of private conferences and one most successful demonstration of his method in a private clinic, will lead to the recognition he deserves in this country. One of his leading disciples, Dr. Jung, of Zurich, accompanied him and also gave a series of lectures in German. Fortunately, too, we now have the above first translation into English of a few of his selected papers. Freud regards his as yet untranslated work on the interpretation of dreams as the key to his system. This, especially the enlarged second edition upon which so much time and labor have been expended, is the best introduction to his work, although it must be admitted that it is hard reading, owing to its technical terms. This, with his other books on wit and on the psychology of daily life, show how his views apply to all the occurrences of human life, waking or sleeping, in health as well as in disease.

Most of his patients have been women and, owing to his fame, many of his cures have been cases of long standing, who have passed through courses of treatment by other physicians. Perhaps the chief common criticism directed against him is that he magnifies the importance of sex in both health and disease. His own claim is that the immense rôle which this function plays in nearly every form of human ill with nervous complications has hitherto been for various reasons vastly underrated, that its manifestations have been everywhere repressed, and that its influence is profoundly felt at every stage of life beginning with infancy. In this respect and in the thoroughness of his analysis and in his disuse of hypnotism, he differs from his own great teacher, Charcot, and from his earlier and older associate, Breuer, as well as from Janet. To our own thinking, his system so far as it is at present developed, lacks one essential thing, and that is adequate recognition of psychic evolution and the influence of past stages of the soul's development upon its present forms of aberration.

In his last book, "Les Névroses," Janet in the few concluding pages has taken the epoch-making step of acknowledging in general terms how a complete understanding of such cases requires us to understand more than is at present known of the early stages of the development of the soul.

Le Doute, par PAUL SOLLIER. Félix Alcan, Paris, 1909. 407 p. (Bibliothèque de Philosophie Contemporaine.)

For the last score of years very much has been written about the will and its re-education, by philosophers, moralists, pedagogues, and psychotherapists, and American pragmatism, which is at bottom a philosophy of will. Indeed, many are coming to believe that truth is what we will. This book is a vigorous reaction against these abuses, which can have nothing but disastrous consequences for morality, pedagogy and therapeutics. To will, it is necessary first of all to know, in order to choose, We must understand the external world and the various physiological and even psychological conditions and consequences. When conditions are not realized, doubt arises because of incertitude and indecision. This is what our age suffers from and really lacks will. At bottom, doubt is an emotive phenomenon due to feeble cerebral resistance. To study it, therefore, now becomes of prime importance for morals and society, to say nothing of pathology and psychology. After some general considerations, the writer takes up in the second chapter the objects and conditions of doubt which, as to the external world, he divides into three parts—that of present, past and future reality; and concerning the ego, he makes three varieties, viz.: as to the object, extent and intent, and time of the doubt. He traces its slow evolution in individual cases and in society, its culmination, decline and disappearance. As to its elements and consequences, he finds them to be affective, sensorial, intellectual, motor; and its causes he traces in sense, in perception, conscience, memory, imagination, association, judgment, feeling, sex, religion, etc. There are certain reactions on the part of doubters that are inherent in the doubt, and dependent upon individual character as well as upon the nature of the doubt itself. Psychæsthenia, obsessions, impulsions, pain, are among these. In treating the reactions of the doubter against the doubt, he considers the consequences as intellectually affective and emotive. The organism and nature of doubt he finds in cerebral feebleness and psychæsthenia; and he gives quite a repertory of modes of resistance, beginning with physical exercise, and passing on to psychotherapy and re-education to action.

Zeitschrift für angewandte Psychologie und psychologische Sammelforschung, Band 3, Heft 3 u. 4. Herausgegeben von WILLIAM STERN und OTTO LIPMANN. J. A. Barth, Leipzig, 1909. pp. 163-318.

Among the interesting articles that constitute this number is one contributed by Victor Lowinsky reviewing the *Pedagogical Seminary*, which has always been devoted to education upon a psychological basis and interested in uniting theory and practice. This, the writer says, "has been Stanley Hall's effort, who, with his ethnologically applied bio-genetic law has summoned the whole modern life of culture in all its breadth and depth before the judgment seat of psychology, since although a culture pedagogue *grossten Stiels*, he seeks always to exert an immediately practical influence. He keeps his eye mainly fixed upon the relations of his own country; nevertheless, the scientific issue of his conclusions always has general interest. Of the pathos and ethos of his discussions, this report, of course, can give no intimation. Pedagogical, medical, historical, and psychological points of view are represented." The writer then proceeds to give an epit-

omy of nearly all the leading articles in the *Pedagogical Seminary* during the last two years, including volumes 14 and 15.

Modern Problems in Psychiatry, by ERNESTO LUGARO. Translated by David Orr and R. G. Rows. University Press, Manchester, 1909. 305 p. (Publications of the University of Manchester, Medical Series, No. XII.)

After describing in his general introduction the evolution of psychiatry—its difficulties, the prejudices that hamper it, and breadth of knowledge needful—the author passes first to the psychological problems and stresses the need of distinguishing direct from indirect results of primary disturbance; discusses parallelism, dualism, etc.; is himself a realist; discusses the applications of psychology to the analysis of mental states of the insane and its difficulties. The anatomical problems are then taken up with a good account of Cajal and others. Then follow problems in pathogenesis, etiology and nosology, with a final practical chapter on treatment, asylum problems, relations to crime, etc. The author bases largely on his own experience and has not emerged from the influence of the Kraepelin school.

L'Année Psychologique, publiée par ALFRED BINET avec la collaboration de MM. von Aster, Becher, Benussi, Bergson, Bloch, Borel, etc. Quatorzième Année. Masson et Cie., Paris, 1908. 500 p.

The first article, 94 pages, is by Binet and Simon on the development of attention in children during successive years. Then follows one by Houllevigue on the physical ideas of matter; another by Souriau on sentiment and æsthetics; then follow articles by Borel, on the calculus of probabilities; an inquiry on the history of the methods of teaching philosophy, by Binet; on professional surveillance, by Imbert; on morals and biology, by Rauh; then a criticism of Poincaré by Goblot entitled Mathematical Demonstration; another article by Binet and Simon, on language and thought; hygiene and pedagogy, by Chabot; pragmatism, by Cantecor; and Binet on experimental chiromancy. The bibliography is less extensive than usual.

Alte und neue Gehirn-Probleme, von W. W. WENDT. Otto Gmelin, Munich, 1909. 116 p.

The best part of this pamphlet is devoted to the study of brain weights of men and women, ordered according to age, height, and weight. There are also statistics concerning the brains of suicides, those that have met with accidents, and those who have suffered other forms of death. The relation of brain weight to different callings in life and the results of all these tabulations are brought together at the end. The author thinks that the most important result of his statistics is that the brains of lowest weight that have nothing abnormal about them belong usually to day laborers; and here the lightest were some 1,120 g., while the lightest academic brain weights were 1,140 g. The author believes that brain weights can be established below which no individual of a certain grade or class ever sinks.

Essai sur la Psychologie de la Main, par N. VASCHIDE. Marcel Rivière, Paris, 1909. 504 p. (Bibliothèque de Philosophie Expérimentale.)

This essay, with thirty-seven full-page plates, is a posthumous work of the brilliant young author who died prematurely two years ago at the age of forty years. It is both comprehensive and unique. Beginning with chiromantic divination, the author proceeds to consider the chirognomy and physiognomy of the hand, from antiquity to the present time; the artistic canons concerning it; he then presents the

history of the hand in art, discusses its anatomy, physiology, psychology, the papillary striations and their value in the identification of criminals, its pathology, writer's cramp, degenerations of the hand, the language of gesture in society, the methods and results of research on the hand, its evolutionary significance, motor images, researches in divination and prevision, and concludes with a special essay on the theory of the possibility of psychic revelations by means of the hand.

Both Sides of the Veil, by ANNE MANNING ROBBINS. Sherman, French & Co., Boston, 1909. 258 p.

This work is introduced by Professor James, and is by a companion of his in psychic research "who from a state of doubt has won through to a faith in human survival in a spiritual order, which continues the visible one. It is a genuine record of a moral and religious experience, profoundly earnest and calculated, I should think, to interest and impress readers who desire to know adequately what deeper significance our life may hold in store." The author evidently lost her creed at Mt Holyoke, soon made the acquaintance of Mrs. Piper, Richard Hodgson, and A. P. Martin; had first failures, then fulfilments. To these the first part is devoted. The second part is entitled Communications from the Other Side of the Veil through Mrs. Piper, with extracts of reports and sittings. The last part is entitled Suggestive Thoughts on the Attainment of Spirituality

A Pluralistic Universe, by WILLIAM JAMES. Longmans, Green & Co., London, 1909. 399 p.

In these carefully studied lectures abounding with all the author's charm of expression, he seeks to "small down the universe" and takes Fechner's notion of a soul of the world as being a deity of sufficient size for humanity to make its deity. To him the whole universe was animated. The earth is in a sense one angel. Plants have souls. His transcendentalism is much above the ordinary pantheism. Consciousness is compounded. We must make a radical breach with intellectualism. The traditional radicalism gives us an essentially static universe. As Bergson, whom this work glorifies, puts it—the function of concepts is practical rather than theoretical. Logic cannot define a universe where change is continuous. Living things are their own others. Empiricism is a better ally of religion than is rationalism. Our beliefs form parts of reality. Indeed the word "rationality" had better be replaced by "intimacy." He wants the basis of discussions for all these questions "broadened and thickened up." He condemns very heartily the Oxford thinkers before whom he lectured for their inane Hegelism, and lashes the German metaphysicians even more severely. In homely terms, the book is a plea that we do not need monism or a unitary view of the world and do not need any theory that has cosmic dimensions; but it is sufficient for us to know the world of which the solar system is the boundary; and all discussions of the absolute and infinite must be abandoned. We have no space to discuss in detail the clever *apperçus* and *bons mots* that sparkle through these pages. It is interesting, however, to note that there could hardly be a more diametrical opposition than between pragmatism, especially the type of it represented by James, and the book of his colleague, Münsterberg, entitled "the Eternal Values," which seems to have been written under the inspiration of the motto: *Delindus est pragmatismus.*

The Meaning of Truth, by WILLIAM JAMES. Longmans, Green & Co., New York, 1909. 298 p.

This volume is an amplification of what the writer calls the pivotal

part of his book on "Pragmatism" and is devoted to the thesis that "the truth is only the expedient in the way of our thinking just as the right is only the expedient in the way of our acting." The present writer believes that most who read this work, unless they are double-dyed speculators as to the abstract question as to what the quiddity of reality actually is, will be interested chiefly in the author's vivacious style which gives a certain sort of interest, even if a meretricious one, to any topic he chooses to consider, and to the fine distinctions he makes between his own views and the various misunderstandings of them that have arisen. The fact that so many intelligent, earnest and respectful, not to say friendly, writers are away off in their interpretation of what James really means and says is itself very significant of the splay-footedness of attempting to treat these serious topics in the off-hand, slap-dash, vivacious way of after-dinner table talk, instead of in the method of severely reasoned, logical thinking that proceeds from point to point, has something that can be called beginning, middle and end, and which is susceptible of proof or disproof, and is met with something more than these tedious, hair-splitting attempts to explain and set others right in a dapper, lively, Hudibrastic way.

Psychology and the Teacher, by HUGO MÜNSTERBERG. D. Appleton & Co., New York, 1909. 340 p.

This is the third book in English of this voluminous author within a few months. In an earlier publication he had declared in a most emphatic way that experimental psychology had nothing in it for teachers. This view he modifies radically here because, as he says, since the first was written new light for education has appeared from the laboratory. But in looking over the thirty-nine chapters, it would be difficult to point out any important theme, the validity of the applications of which was not nearly as well known ten years ago as now. What would have been the harm for this writer frankly to acknowledge a change of view on his own part, which has certainly been both radical and excellent? As for the book itself, it claims, as we understand it, to have nothing whatever new for the psychologist. It is extremely elementary and rehearses what has long been well known. The author also still carefully follows what seems to have long been his policy in refraining from making acknowledgments to other writers, save in a line or two giving a mere list of names. With this point of view it is, for the present writer at least, hard to feel reconciled. The reader should be given a little help on the important topics toward further reading if so disposed. It gives the book an oracular character as though now, for the first time and from this particular author, the truth was vouchsafed to the reader.

Die Funktionen der Nervencentra, von W. v. BECHTEREW. Zweites Heft. Gustav Fischer, Jena, 1909. pp. 695-1336.

This is the second volume of the German translation by Richard Weinberg of the venerable author's probably final revision of his views and account of his own researches. It is devoted to the cerebellum, the mid-brain, and the subcortical ganglia, with 142 cuts.

La Philosophie de S. S. Laurie, par GEORGES REMACLE. M. Weissenbruch and Henri Lamertin, Bruxelles, 1909. 524 p.

All friends of the eminent Scotch educator, born in 1829, will welcome this account of his philosophy. It is divided into two parts: first the theory of knowledge, and second his views of God and man.

Grundriss der Psychologie für Juristen, von OTTO LIPMANN. J. A. Barth, Leipzig, 1908. 80 p.

This book consists of the following lectures: 1. on the essence and method of psychology; 2. the intellectual side of psychic life, including sensations, perceptions, attention, suggestion, association and memory; 3. the side of feeling and will; 4. psychology of *Aussage* as represented by Stern; and 5. the *Tatbestandsdiagnostik* from the standpoint of Freud.

Esthetics, by KATE GORDON. Henry Holt & Co., New York, 1909. 315 p.

This work deals with imagination, feeling, principles of art, rhythm, dancing, music, color, light and form, design, architecture, sculpture, painting, language as an art medium, poetry, drama, prose, and general conceptions of beauty and art. The work certainly does fill a long-felt want, for we know nothing in English that covers this ground.

Elementary Experiments in Psychology, by CARL E. SEASHORE. Henry Holt & Co., New York, 1908. 218 p.

This book makes individual experiments as opposed to class demonstrations practicable, regardless of laboratory facilities or the size of the class. A student is given means and encouragement for pursuing each problem intensively, that he may acquire independence of thought and action, realize the actuality of mental processes, and get here and there a vision of the vastness and orderliness, the practical significance and the charms of the mental life.

The Philosophy of Change, by D. P. RHODES. The Macmillan Co., New York, 1909. 389 p.

In chapter I the author shows the origin of the theory of change in common knowledge. In the succeeding chapters he reviews the principles that underlie human life under the form of an inquiry into the possible destiny of man's various activities, viewed in the light of the past. He next considers the universe of matter and ether, points out the true importance of the problem of reason and will, shows the bearing of this philosophy on the special theory of dissolution, deals with the relation between life and death, discusses the mode of life of any terrestrial race who should hold as rational the view of faith as now attainable. The two last chapters contain random observations upon life as we know it, the uses of rational pessimism, and literary style. It must have given the author great pleasure to solve so neatly so many of the great open questions of the universe.

Wellesley College Studies in Psychology No. 1. A Study in Memorizing Various Materials by the Reconstruction Method, by ELEANOR A. MCC. GAMBLE. The Psychological Publishing Co., Lancaster, Pa., and Baltimore, Md. 210 p. (Psychological Monographs, Vol. X, No. 4, Sept., 1909. Whole No. 43.)

The first chapter states the problems, the second the material (sense, colored paper, nonsense, symbols) with the operations of chance and various limitations. The third gives the method of presenting a series. The fourth deals with the effects of experiments in memorizing upon the serial order of smells and colors. The fifth gives the actual processes involved in memorizing the serial order. The work is carefully, not to say elaborately, done, and is worthy of the author's well-known care and diligence as an investigator.

La Cyclothymie. De la Constitution Cyclothymique et de ses Manifestations, par le DR. PIERRE-KAHN. G. Steinheil, Paris, 1909. 252 p.

This book on intermittent depression and excitation may be said in

some sense to carry on the work of the great Belgian alienist. In the first part he describes the etiology, symptomatology, evolution and diagnostics of excitation. The second part deals with pathogeny and the cyclothymic traits in various mental states and in somatic diseases, especially its relations to gout and diabetes. The subsequent chapters deal with the treatment and with medico-legal considerations and provisions.

Die Weltanschauungen der grossen Philosophen der Neuzeit, von DR. LUDWIG BUSSE. Vierte Auflage herausgegeben von Dr. R. Falckenberg. B. G. Teubner, Berlin, 1909. 156 p. (Aus Natur und Geisteswelt, Sammlung wissenschaftlichgemeinverständlicher Darstellungen. 56. Bändchen.)

The first part deals with the great philosophers before Kant; the second with those since Kant ending with Compte, Mill and Spencer. It is a good little repetitorium for the history of philosophy.

Outlines of Psychiatry, by WILLIAM A. WHITE. Second edition revised and enlarged. The Journal of Nervous and Mental Disease Publishing Co., New York, 1909. 232 p. (Nervous and Mental Disease Monograph Series No. 1.)

This is the second edition of what appears to have been a successful compend dealing with the nature and definition of insanity, classification, cause, treatment, symptoms, examination, paranoia, manic-depressive psychoses, paresis, dementia præcox, involution, melancholia, senile psychoses, infection, exhaustion and toxic psychoses, the psychoses associated with other diseases, borderland and episodic states, with an essay on imbecility.

Consciousness, by HENRY RUTGERS MARSHALL. The Macmillan Co., New York, 1909. 685 p.

This volume compares well with the author's important volume, "Pain, Pleasure and Æsthetics." It is wrought out with great care. The first book deals with consciousness in general—first, that of man; second, that of other than human forms. Book Second is on the general nature of human presentations, with first the general qualities of relation aroused in connection with all presentations; then the general qualities determined by complexity of presentations. Part II is on qualities of relation determined by the correlation of the general qualities studied in Part I. The third book is on the Self.

The Distribution and Functions of Mental Imagery, by GEORGE BETTS. Teachers College, Columbia University, Contributions to Education, No. 26. Teachers College, Columbia University, New York, 1909. 99 p.

The author first experimented with college students and also trained psychologists and then upon spontaneous imagery of various kinds. He has clearly made an important contribution to this now very interesting subject.

Imitation in Monkeys, by M. E. HAGGERTY. Reprinted from the Journal of Comparative Neurology and Psychology, Vol. XIX, No. 4, July, 1909. pp. 337-455.

Popular thought regards imitation as the chief function of monkey life; so that the author's experiments are so important and interesting as to give us much more respect than we had before for the intelligence of monkeys. Those who remember the newspaper notoriety these tests had in New York, where they were made, will be agreeably disappointed to find that they are really scientific.

Logic Inductive and Deductive. An Introduction to Scientific Method. By ADAM LEROY JONES. Henry Holt & Co., New York, 1909. 304 p.

The contents of this book can be indicated by its chapter heads as follows: first stages of knowledge, classification, use and abuse of words, proposition, induction, verification and deduction; the syllogism—its traditional treatment, abbreviated and complex forms of reasoning, the hypothetical and disjunctive syllogism, proof and disproof. Then follows a special part on supplementary methods, viz.: statistics, averages, probabilities, the construction of systems, hypothesis, typical systems of knowledge.

Problèmes de psychologie affective, Par TH. RIBOT. Paris, F. Alcan, 1910. pp. 172. Price fr. $2.50.

Professor Ribot has here brought together, with some modification and revision, five of his recent essays on affective problems. The first paper, on affective consciousness (*Rev. philos.*, April, 1909), argues that pleasantness and unpleasantness are but secondary symptoms of the affective life, the true basis of affectivity lying in cœnæsthetic and motor tendencies, and thus in a dimension akin to Wundt's excitement-depression and Royce's restlessness-quiescence. The second, on affective memory (*ibid.*, Dec., 1907; *cf. Journ. de psych.*, July-August, 1909), brings additional evidence for the writer's theory of a purely affective memory,—evidence which will be accepted or rejected according to the reader's definition of affective process. The third, a study of antipathy (*Rev. philos.*, Nov., 1908), is especially valuable, as breaking what is practically virgin soil in psychology. The fourth, on the nature of pleasure (*ibid.*, August, 1909), is rather critical than constructive, although the author gives fresh formulation to his well-known doctrine that pleasure is the conscious translation of the fact of successful functioning on the part of the physical or mental constitution. The concluding essay, on a form of affective illusion (*ibid.*, May, 1907), discusses certain cases of misfelt (if that term may be coined) and misinterpreted feeling, as the euphoria of the seriously ill, or our belief that we desire a visit the postponement of which reveals that we had been looking forward to it with aversion.

Professor Ribot gives a half-promise, in his preface, of a future work on affective theory, to be entitled *La vie affective et les mouvements.* Such a book, written with critical regard to the definitions and usages of other contemporary psychologists, would be of extreme interest. As it is, one is often puzzled to say whether one agrees or disagrees with the writer, since he nowhere takes up a definite position as to the dividing line between affective and sensational experience. Thus, though he rules out kinæsthesis, warmth and cold (with their derivatives) from any share in the strictly affective life, he nevertheless regards cœnæsthesis as purely affective in character, and makes affection essentially motor in derivation. Even a negative demarcation, the statement that such and such organic experiences are sensory and consequently non-affective, if made with sufficient definiteness and rigidly adhered to, would be of great assistance in clearing up the points upon which Professor Ribot agrees with and differs from other students of the subject. It is a further source of confusion that the essays slip back and forth, without warning, between the biological and the psychological standpoints.

FRANCIS JONES.

Genetic Psychology: an Introduction to an Objective and Genetic View of Intelligence. By E. A. KIRKPATRICK. New York, The Macmillan Co., 1909. pp. xv., 373.

"In working out the general principles of mental genesis it was found that the more specific problem of mental phenomena as organized in individual minds could not be satisfactorily treated till the general truths of organic activity and of mental genesis had been formulated, and that space would not admit of the treatment of both in a single volume. The author hopes to treat of mental development in individuals and some of the pedagogical implications in a subsequent volume." The present work, which may thus be considered as the first volume of a complete Genetic Psychology, contains eleven chapters. Chapter i., Introduction, discusses the nature and scope of genetic psychology, the general characteristics of organisms, evolution and the genesis of behavior and of mind, the psychical factor in behavior. Chapter ii. treats of the structural basis of behavior, and Chapter iii. of types of animal behavior. Chapters iv. and v. consider instinct, that is, complex behavior characteristic of species, and the acquisition of habits and ideas, that is, the behavior of individuals; and Chapter vi. sets forth the structures concerned in complex behavior and in ideation. Chapter vii., Consciousness, discusses the objective and subjective criteria of consciousness, and the probable general characteristics of the consciousness of animals; Chapter viii. characterizes some specific conscious states (pain, intellectual states, volitional activity). Chapters ix. and x. deal with types of adaptive activity or intelligence, and types of learning activity; and the concluding Chapter xi. outlines the general theory and principles of racial and individual development.

The work originated in lecture-courses given to summer students at Columbia and Chicago universities, and parts of it have been read as lectures in a normal school. In origin and plan of treatment, the author says, pedagogical interest has played a large part. "It is probable, also, that popular interest is great enough to make the book acceptable to the more serious of those interested in animal behavior." On the scientific side, "it is hoped that this tentative formulation of the truths supplied by various sciences may help to promote more harmony of effort on the part of the workers in the several related fields."

However, as a scientific work, the *Genetic Psychology* cannot compare with Washburn's *Animal Mind*. Probably, indeed, the author would resent the comparison. It seems fairer to consider the book as a frankly popular work, intended to catch the interest of the beginning student and of the general educated public, and to lead on beyond itself to a strictly scientific interest in the problems of mental development. If we regard it in this way, we have a readable work, logically planned, and kept almost always at the level of common-sense intelligence, so that it may be understood without effort. Interest is maintained by illustrations, anecdotes and examples; and that the interest may at once find sustenance, a selected bibliography of easily accessible sources is appended to every chapter.

If we apply scientific standards, on the other hand, the author must be convicted of looseness of argument and over-hasty generalization. Take, for instance, the concrete case by which he seeks to demonstrate the mode of operation of natural selection (p. 9). "Why are not sparrows as large as geese or as small as flies instead of being just about the size they are? After a severe storm a large number of sparrows were picked up in a helpless condition and as many as possible resuscitated. All were then weighed and measured to determine

the size and proportion of parts. It was found that nearly all that varied to any considerable degree from the average were dead, while most of those near the average in all respects were alive. This of course means that a certain size and proportion of parts are most favorable for a sparrow living in this climate, and that those birds that vary the most from the normal are likely to be destroyed and produce few or no descendants. In a different environment or living a different life, the size and proportion of parts of the sparrow might be different, but in any case environment determines through natural selection the size of sparrows living in a certain way in a certain place." We notice, first of all, that no definition is given of a 'part', and that the 'average' used is not specified; however, it is probable that external measurements only were made, and that the average is the arithmetical mean. We notice, secondly, the implication that sparrow size and sparrow proportion of parts may differ in different environments and with different modes of life; the implication is left vague, without reference to the facts of variation; so that the thoughtless reader might actually conceive of sparrows, in some outlandish quarter of the world, as large as geese or as small as flies. These are minor points of criticism. It is more important to note that the argument as a whole is unsound. Once sparrow-size has been fixed (whether by the direct action of environment, by the operation of natural selection, by intrinsic laws of growth, or by any other causal agency or combination of causal agencies), then deviation from the normal will probably bring with it a constitutional weakness; over-large sparrows, *e. g.*, may have too small hearts, oversmall sparrows may have an inadequate musculature, and so forth. The experiment brings no evidence whatsoever that "a certain size and proportion of parts are most favorable for a sparrow living in this climate"; it brings no evidence, that is, that a sparrow as large as a robin (if such a bird existed) could not propagate its kind, in the climate referred to, as well as or even better than the existing species; it shows only that, when once size has been fixed, considerable departure from that size, on the part of the individual, means unbalance of the vital functions. The question "why sparrows are not as large as geese or as small as flies" is not touched; the illustration proves, at most, that a size once fixed is maintained.

The passage quoted continues as follows: "What is true of the size of the sparrow is true of all his other characteristics, including his behavior; for if he attempted to do what his structure does not fit him to do, he would be at a disadvantage and would be eliminated by natural selection." Yet on p. 11 we read of "changes in the mode of behavior of different groups of the common species, which *necessitated corresponding changes in structure*" (italics not in original). Slips of this sort are not uncommon.

Consider again the following passages. "In studying the structure and behavior of various types of organisms we must interpret them as means of survival for the individual or for the species" (p. 10); "it is reasonable to suppose that this [consciousness] *like all other characteristics of organisms*, is the product of natural selection, and that it has been preserved in certain kinds of behavior of certain organisms because it has proved useful" (pp. 13 f.; italics not in original). Yet the biologists themselves are tending more and more to emphasize the occurrence of non-adaptive variations. And apart from the question of the all-sufficiency of natural selection, the author forgets that utility is not a scientific concept. The natural world is a world of causation; and when we have explained in terms of cause and effect, our explanatory task is done. Huxley says somewhere that

the *Origin of Species* appeared to him, as he read it, to give the death blow to teleology in the domain of life-phenomena. Teleology has, unfortunately, come to life again, and flourishes all too abundantly in the pages of this book.

The treatment of consciousness is vacillating (13 f., 190 f., 257 ff., etc.). There is ground for making consciousness a form of energy, and using it as such in causal explanation. It is legitimate also to adopt the working principle of parallelism, and to leave consciousness out of account in dealing with the material world of physics and physiology. Both positions are defended by competent psychologists, and both have weighty arguments in their favor. The author takes a sort of middle course between the two views. Consciousness is the product of natural selection,and has been preserved because it is useful; yet "it is safer not to *assume* conscious states until all the simpler and more demonstrable factors in behavior have been given due weight" (p. 13). Why 'simpler'? Why should consciousness be a complex factor in behavior? "In general, the function of consciousness is not to actually do things but to adjust apparatus for doing them, note the results, and readjust as needed" (p. 205). The function would, then, be simple or complex according as the apparatus are crude or delicate. *Cf.* p. 178: "in racial development consciousness in the form of rudimentary feeling indicating the necessity or non-necessity of movement may be present momentarily even in the lowest organisms and help to produce more prompt and effective reactions." Here the function of consciousness would be extremely simple; nothing more, in fact, than the saying of Yes or No to a motor impulse.

A final word may be said with regard to the writer's four levels of adaptive activity or 'intelligence'. First in order comes physiological intelligence, shown especially in nutritive and growth processes, and concerned with the direction of activities taking place within the body in such a way as to preserve life. Next follows sensory-motor intelligence, with or without consciousness, directing movements of a part or of the whole body in response to external stimulation in such a way that favorable results may be secured. In the third place stands representative intelligence, of which imagination and memory are characteristic manifestations, making possible economy of movement, ministering to psychical needs, and teaching by way of imitation. Last of all comes conceptual intelligence, which not only makes it possible to accomplish certain purposes more quickly and effectively than by sensory motor or representative intelligence, and to meet new situations which could not be reacted to effectively by any other form of intellectual process, but also enables its possessor to go beyond what can be experienced or even represented. It seems clear that we have, in this hierarchy of faculties, a logical construction of the kind dear to Romanes and his contemporaries, rather than an actual picture of the course of mental evolution.

It is natural for a critic, writing in a technical journal, to estimate the worth of a book from the purely scientific point of view. The present writer can, however, conceive (as he indicated above) that the *Genetic Psychology*, despite all its sins of scientific omission and commission, may serve a very useful purpose as a popular introduction to its subject. Many a student has been attracted to a science by some general treatise, to which he will acknowledge a real debt of gratitude on that account, even though in later years he reject or essentially modify its teaching. OTTO PERLER.

Die Kitzel-und Juckempfindungen. Von S. ALRUTZ. Separat-Abdruck aus dem Skandinavischen Archiv für Physiologie, XX, 1908, 371-410.

The recent work of Török (*Zeits. f. Psych.*, XLVI) made it appear fairly certain that superficial tickle is to be referred to the pressure organs, and itch to the organs of cutaneous pain. The probability of this ascription was strengthened by Murray's failure (this *Journal*, XIX) to confirm Alrutz' observation, of which more was made by Thunberg than by Alrutz himself, that sensations of tickle may be aroused in the regions of the skin lying between the pressure-spots and consequently insensitive to pressure. In his present paper, however, Alrutz continues to identify tickle and itch. It is impossible, he says, to draw a sharp introspective distinction between the two; there are times and places when you cannot decide which you are experiencing; there are, that is, transitions between the extreme forms. There is no introspective resemblance between either tickle or itch and light pressure (contact). Nor is there any observable likeness between tickle and prick. Itch, on the other hand, is like prick and may pass over into prick by intermediate stages.

After a review of previous work, normal, pathological and clinical, and after reporting further experiments of his own, Alrutz decides positively that itch has nothing to do with pressure. He decides, also, that it is as good as proved that tickle is altogether independent of the pressure sense. Tickle and itch thus appear as one and the same quality, differently named according to the mode of stimulation (external or internal) of the organ, of a distinct sense. The organ itself is probably a less differentiated form of the pain organ. He adds that punctiform pain or prick, and diffuse cutaneous pain or smart, come from the same terminal organ, namely the cutaneous organ of pain.

It is difficult to see how these conclusions are to be reconciled with the results of Murray's work upon tickle. In the reviewer's opinion, Alrutz is not justified in identifying the qualities of tickle and of itch.

P. E. WINTER.

Those Nerves, by GEORGE LINCOLN WALTON. J. B. Lippincott Co., Philadelphia, 1909. 203 p.

This is a very chatty series of very informal talks, especially on various obsessions and physical habits and their control. The object of the book is to promote such habits of mind as may make for health as well as happiness. It is preventive.

NOTE

The life and work of Liégeois, professor of law, for many years in the University of Nancy and one of the founders, with Liébault and Bernheim, of the "Nancy School" of hypnotism, has been fittingly commemorated by the erection of a monument by international subscription, in his native city of Damvillers. The monument takes the form of a bust upon a pedestal of granite and stands in the square before the city hall. The formal exercises of commemoration took place on Oct. 24, 1909, in the presence of official delegates from the University of Nancy, the Institute of France, the Society of Hypnology, and men of science of France and other countries. Addresses were delivered by MM. Charles Humbert, Van Reuterghem Bérillon, Bonjeau, Lyon, Caen the mayor of Damvillers and others. Liégeois besides doing successful work in economics, has put both psychologists and jurists in his debt by his pioneer studies of hypnotism and suggestion in their medico-legal aspects.